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(Signed)... Jane Salmon Ashcroft

PERMANENT ADDRESS:

...12509 Woodland Place,
...Edmonton, Alberta
.....

DATED... April 18 ... 1974

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ABSTRACTING BASIC GAME FORMS FOR LEARNING

by

© SARI SALMON SCHIFF

A THESIS

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The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies and Research for acceptance, a thesis entitled "Abstracting Basic Game Forms for Learning" submitted by Sari Salmon Schiff in partial fulfilment of the requirements for the degree of Master of Education.

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Supervisor

.....

.....

DATE December 14, 1973

ABSTRACT

This study proposed a general format to help teachers adapt basic game forms for developing specific skills to complement learning in young children. A review of relevant literature in the fields of learning, child development, play, and games, revealed five interrelating theoretical principles of motivation, participation, reinforcement, repetition, and individual variability, on the basis of which criteria were established for selecting games. These five criteria were then applied to the selection, examination, and classification of nine popular existing table games.

Through a further analysis of these representative existing table games the following six types of basic open game forms were extracted: (1) the deck of playing cards, (2) the domino-type deck of playing cards, (3) the chance grid game board, (4) the strategy grid game board, (5) the start-finish path game board, and (6) the continuous path game board. A general format was outlined for adapting these open game forms into the actual games that complement learning in specific situations and actual adaptations of each of the six basic open game forms were discussed and illustrated.

Based on the findings of this study, it would appear that basic open game forms not only exist, but can also be identified and described in such terms that teachers can adapt these game forms for specific learning purposes.

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CHAPTER 1

INTRODUCTION TO THE PROBLEM

In both the classroom and the literature there is evidence that most teachers of young children feel the need to reinforce what is taught in school with some form of repetitive practice to ensure learning. The repetitive methods used vary from teacher to teacher, and from the more traditional rote drill, done orally or in writing, to the more progressive play-learning approach.

Figuring largely in this "play-learning" approach are instructional games which offer the child an opportunity to practice what has been taught. There are two ways of obtaining these instructional games. One way is to buy those games which are commercially produced and the other way is to prepare the games in the classroom. As the commercially produced games apply only to a limited number of skills, the need for classroom prepared games which are designed to meet specific needs of pupils becomes apparent.

Classroom prepared games have the advantage of being able to personalize and individualize learning while developing resourcefulness and independence and offering an opportunity to put learning into practice. Many teachers have felt this need to individualize learning and have met the challenge by preparing instructional games for classroom use. However, classroom observation reveals that there is often little rhyme or reason in the design and use of these

instructional games. In metaphorical terms, they are applied like bandaids rather than used as an integral part of the general treatment. These games should be used in a professional way, that is, in a way that suggests skill and understanding of the tool being used to the extent that a reasonable certainty of results exists.

A professional approach to games would involve a basic understanding of relevant principles of learning, child development, play, and games. While a fair amount of investigation and writing has been done in each of these fields; that is, learning, child development, play, and games, little systematic work has been done on the topic of games designed not primarily to teach, but rather to reinforce learning in the developing child. A few books and numerous articles have been written on specific games that can be used in specific situations. A smaller number of books advises teachers and student-teachers on how to prepare sets of instructional materials. As a technology of teaching develops, however, a wide repertoire of teaching and learning materials is being recognized as a necessary part of every teacher's professional preparation.

It is unlikely that any book can give teachers all the specific materials needed to teach a diverse group of children. To attempt to do this is useless; to claim to have done it, meaningless. Only the teacher can decide what each child needs. The teacher is trained to do just this. She, who best knows the needs of her children and having recognized these needs, can best design and prepare the instructional materials that meet these individual needs.

PURPOSE OF THE STUDY

The purpose of this study is to extract a general format to help teachers develop specific skills in young children through the use of basic games.

STATEMENT OF THE PROBLEM

The fundamental problem is to delve into relevant literature and research on learning, child development, play, and games, as well as to examine actual games in an attempt to answer the following questions:

1. What are the relevant theoretical principles underlying learning, child development, play, and games?
2. In the light of these principles, what criteria must be followed for selecting game forms?
3. In the application of these criteria to existing game forms, what basic open game forms are identified?
4. How can these open game forms be adapted for specific purposes and for developing specific skills?

DESCRIPTION OF THE STUDY PROCEDURE

As this study is not experimental, a process of reading, thinking, and applying ideas will be followed in an attempt to follow the steps outlined below:

- to explore theoretical principles of learning, child development, play, and games;

- to set criteria for selecting and constructing basic game forms;
- to investigate basic existing games that illustrate the theoretical principles and meet the set criteria;
- to present, by applying the above principles and criteria, open game forms; that is, basic forms that contain only the actual game mechanisms and thus are open to adaptation by the teacher for selected learning purposes;
- to adapt some of these open game forms and to illustrate these principles operating in selected games for developing specific skills for young children.

SIGNIFICANCE OF THE STUDY

This study is carried out to provide a guide for teachers in the selection and construction of game forms which can then be adapted for definite and specific purposes.

This study hopes to provide teachers with the information they need in order to use game materials more professionally.

DEFINITION OF TERMS

A game, as defined in this thesis, is

> an exercise of voluntary control systems, in which there is a contest between powers, confined by rules in order to produce a disequilibrial outcome (Avedon and Sutton-Smith, 1971, p. 405).

Basic games refer to common forms of table games, that is, to selected forms of existing board games and card games, for

example, "Bingo," "Gin Rummy," etc.

The term open game form refers to the basic form of a game, devoid of any skill or thematic content.

The term format, as used in this thesis, refers to the general application of theoretical principles and criteria to the adaptation of open game forms for specific learning purposes.

Specific skills are those defined by the teacher adapting and using these games.

DELIMITATIONS OF THE STUDY

1. No attempt will be made to provide actual games that can be used but only to provide the principles and the open game forms that underlie basic games.
2. The study is restricted to games that complement learning which goes on in the classroom and as such it does not concern itself with teaching games or simulation games.
3. No attempt will be made to provide an exhaustive analysis of all games, but rather to concentrate on a selection of the more commonly used table games.
4. This study is especially designed for early childhood although it may have application to older children as well.
5. Games are intended as only one aspect of the total teaching-learning process.

CHAPTER 2

THEORETICAL BACKGROUND AND REVIEW OF LITERATURE

This chapter will review relevant literature in the fields of learning, child development, play, and games, with the purpose of extracting theoretical principles that can later be applied to actual use of games in the classroom, that is, to the selection, and construction of basic game forms for young children.

LEARNING

If teachers are to use games and game materials more professionally in education, they need a firm theoretical foundation on which to build their specific purposes. It is not enough to recognize the fact that pupils enjoy playing and eventually learning from game activities. This fact is common knowledge. What teachers actually require is professional knowledge; and professional knowledge in any field stems from theory. By consciously applying theoretical principles to actual educational practice, teachers may place greater confidence in the choices they make.

The Role of Theory in Learning

Studies of the learning process have produced basic knowledge about learning. Learning theorists work with this basic knowledge but follow different interpretations of it. Learning theories must therefore be regarded as attempts to understand and describe the

learning process. Yet a fund of basic knowledge does exist and those persons involved in the educational process should be well acquainted with existing knowledge about learning. For it is only through a clear understanding of what is known that these principles can be applied effectively in educational practice.

Hilgard (1966) attributed recent interest in the psychology of learning to "the realization that the sounder our basic knowledge about learning processes, the sounder will be our technical applications in training and education (p. v)."

Experimental studies have established phenomena of learning behavior which can be applied to complex learning situations in everyday life. By studying the basic components and underlying principles of everyday learning, we can get a better understanding of what learning is. This understanding can be extracted from one situation and used to predict learning in a variety of other everyday learning situations (Hill, 1971, p. 8).

The complexities of learning force us to regard theories as more or less adequate ways of summarizing our present knowledge, and organizing to gather new knowledge (Hill, 1971, p. 201). Hilgard (1966) holds that there is something to be gleaned from each of the theories yet "no one theory has succeeded in providing a system invulnerable to criticism (p. 13)." There remains then the ultimate goal of building a general theory of learning which is at the same time both broad and precise. Some criteria for this ideal theory of learning were elaborated by Hill (1971): the developmental process, the detailed present stimulus situation, the process of

paying attention (an interaction of the former two criteria), and motivation and reinforcement (Ch. 9).

In the absence of this ideal theory of learning, McConnell (1942) attempted a reconciliation of learning theories. He regarded the principles of learning as a kind of continuum, for "although certain phases of the learning process. . . have a different systematic significance from one theory to another, they may point to approximately the same practical consequences (p. 256)." Hence it may be claimed that fundamental points of agreement do exist in learning theory.

In looking at both the typical problems confronting learning theories, and the issues on which learning theories divide, Hilgard (1966) stressed that the differences among the learning theorists are primarily in the interpretation of the observed data rather than a denial of the actual data (Ch. 1).

An Overview of Learning Theory

Logan (1969) defined learning as "a relatively permanent process resulting from practice and reflected in a change in performance (p. 2)." Mednick (1964) gives essentially the same definition but does so through a list of the defining characteristics of learning, that is, "a change in behavior. . . as a result of practice. . . relatively permanent. . . and not directly observable (p. 18)."

It becomes obvious then that learning is not a simple, straightforward process. In fact, learning cannot be directly

observed. Evidence of the occurrence of learning must be inferred from observation of behavior. To quote Logan (1969):

> Learning is viewed as a potential for behavior -- as habits (or knowledge) available for execution. Motivation is the activator or energizer of these habits into actual performance (p. 152).

Thus, we need both prior learning and motivation for any performance to occur. But learning, by definition, requires practice and for practice to occur, we must also have some performance. That is, the performance will initially involve the practice of responses until they are fixed sufficiently to be considered learned behavior. Then, the performance will be considered a demonstration of learning which can in turn serve as the practice base for further learning. A model of this explanation of learning and motivation can be seen in Figure 1.

Performance itself occurs in three stages: (1) what precedes the performance, (2) the performance itself, and (3) the consequences of the performance (Mednick, 1964, p. 19). In a situation where the goal is to facilitate performance, this consequence would take the form of a reward, a reward being defined as "an event that immediately follows a response and increases the likelihood of that response (p. 22)." Since we have to infer learning from performance, it is also the principles of performance that learning theory encompasses.

Motivation and Reinforcement

Every aspect of performance seems to be strongly influenced by two factors. They are motivation and reinforcement. The former

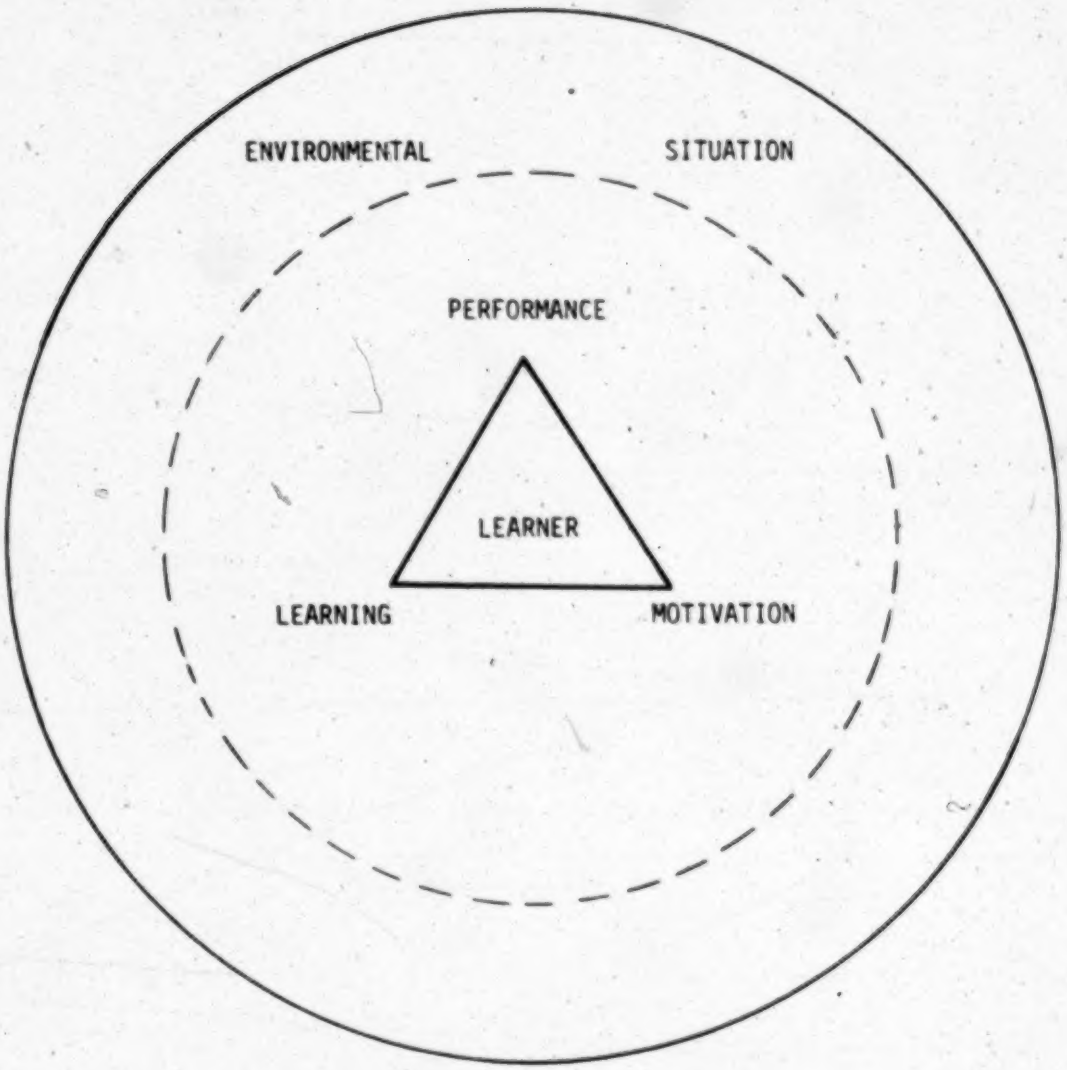


Figure 1

A Model of the Learning Process

is an essential precedent to performance, and the latter, either positive or negative, is what follows any performance.

Motivation. E. J. Murray (1964) gave this definition of motivation:

> There is general agreement that a motive is an internal factor that arouses, directs, and integrates a person's behavior. It is not observed directly but inferred from his behavior or simply assumed to exist in order to explain his behavior (p. 7).

He distinguished motivation from those other factors that also influence behavior, that is, the person's past experience, his physical capabilities, and the environmental situation in which the person finds himself, although he recognized that these factors can influence motivation. The relationship of the factors delineated by Murray are illustrated as components of Mednick's (1964) stages of performance in Figure 2.

Thus motivation consists of an interplay of both activation of behavior (or drive), and direction of behavior (or incentive), and some theorists would add to these a conscious desire (or want) of something. Both drive -- the push from the start, -- and incentive -- the pull to the end, -- are necessary for performance, and affect the nature of the performance.

There are two aspects of drive. Primary motivation is unlearned; it involves any condition which tends to arouse the organism without any special training or experience (Logan, 1969, p. 169). Examples of primary motivation are hunger, pain, and some psychologists would include curiosity. Secondary motivation applies

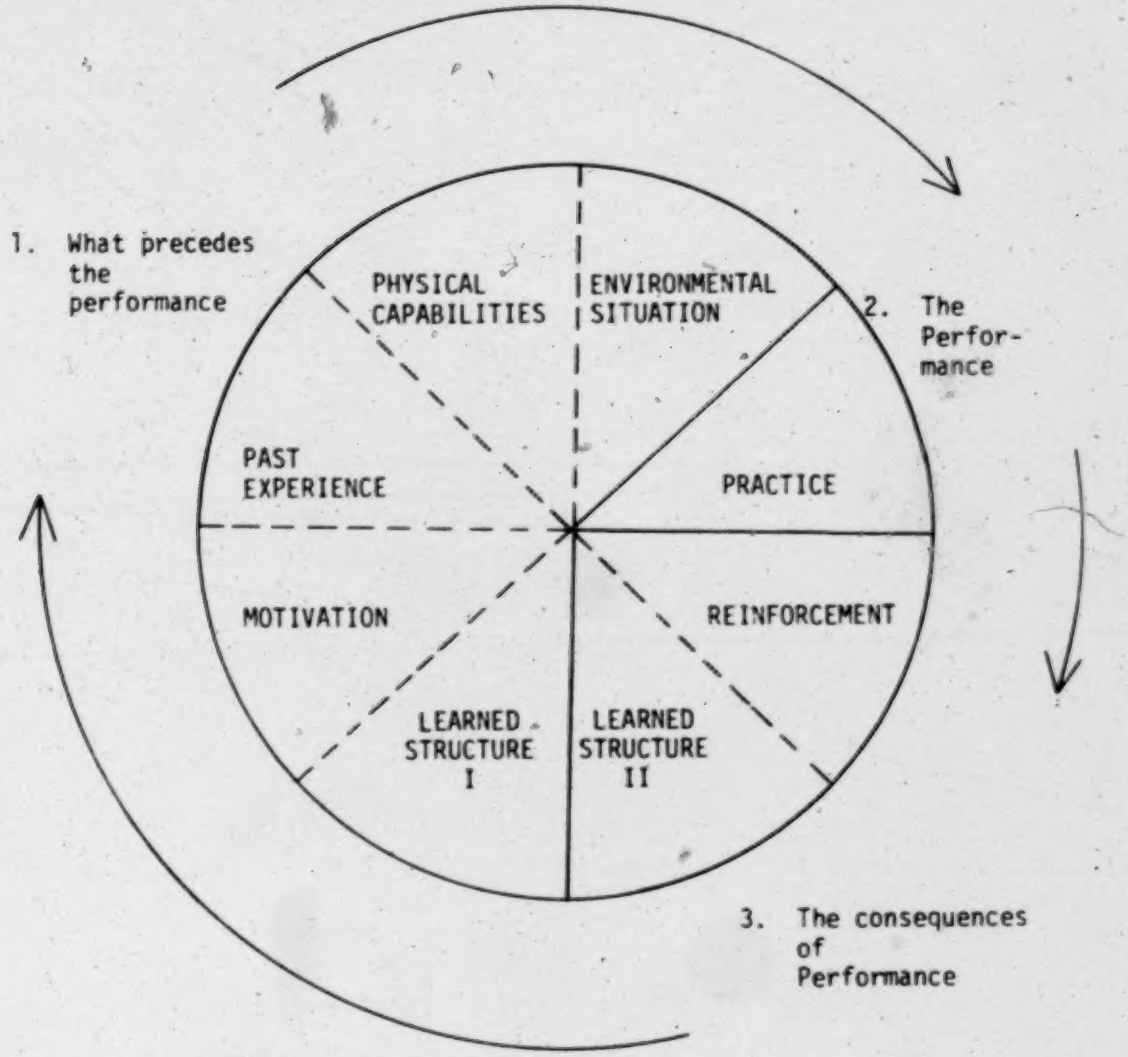


Figure 2

The Stages of Performance
and their Components

to "drives that have been learned or acquired by the organism rather than ones that arise from biological needs without prior experience (p. 180)." Examples of secondary motivation are fear and frustration. Logan finds little evidence of positive sources of secondary motivation. The relationship between drive and performance is such that performance, generally, is "an increasing function of drive (p. 169)" so that stronger drive gives stronger performance.

Incentive motivation is also important in giving strength and direction to behavior. Logan holds that "reward affects performance not as a learning variable but as a motivating variable; reward provides incentive motivating the performance of habits (p. 194)."

As far as incentive is concerned, there appears to be an optimum level of motivation for learning any task, and "the more difficult the task, the lower the level of motivation that will promote efficient learning (p. 154)." It would thus seem that the challenge of mastering a difficult task in itself possesses motivating factors, and so less external motivation is required.

However, much of observed behavior does not seem to fit neatly into this view of motivation. We must then distinguish between extrinsic motivation and intrinsic motivation. Murray (1964) explained it as follows:

> Almost any response can be learned and performed on the basis of a reward such as food or approval, including exploration and play. In such situations the reward is extrinsic to the activity -- there is no inherent connection between the activity and the reward. The activity is performed in order to get the reward. Exploration, play, and other activities

> however, may also be intrinsically rewarding -- they may be engaged in for their own sake, for some inherent pleasure or satisfaction. Extrinsic rewards cannot account for this playful sort of behavior. . . Much of this activity seems intrinsically motivated (p. 74).

There is strong evidence to suggest that motives such as curiosity, play, and related behaviors may be innate.

Sensory deprivation studies carried out at McGill University emphasize the human need for environmental stimulation. Lack of sufficient stimulation interferred, among other factors, with ability to concentrate and to pay attention (Herron, 1957).

Piaget's research on cognitive development, especially the numerous studies of very young children, repeatedly finds curiosity actively stimulating behavior that in turn facilitates further development (Flavell, 1963, Ch. 3). Butler (1954) has shown novel stimuli and stimulus deprivation to arouse curiosity in monkeys. Similarly, Harlow has studied curiosity, activity, and manipulatory drives in monkeys (Butler, 1954).

The developing child seeks to do things for no other reward than the chance to be active; this activity is intrinsically rewarding. When the novelty of a task wears off, a mastery drive appears to take over as the primary motive. However, it should be noted that over exposure to specific tasks can lead to satiation (Murray, 1964, p. 78).

The exercise of the intellect is also shown to be something from which humans gain intrinsic satisfaction (Murray, 1964, p. 79). This leads to the concept of social motivation:

> All these motives involve people -- being with them, competing against them, enhancing one's self-esteem with them or through them. This interaction with other people is why we call these social motives (p. 84).

The theorists are in controversy as to the origins of these social motives, but they offer much evidence that these motives do exist. Studies by Harlow (1959) strongly support an innate social motive as opposed to one derived from experience.

It becomes increasingly obvious that social motives influence much human behavior. Henry A. Murray made an intensive study of human "needs" from his position as a motivational psychologist. His tentative list of twenty needs (or social motives) which includes those of "achievement," "affiliation," and "play" (Hall and Lindsay, 1957) can be found in Appendix A. These motives seem to affect performance and to facilitate learning under certain conditions (E. J. Murray, 1964, Ch. 8).

Maslow (1964) looked at human motivation and devised a hierarchy of five basic innate motives or needs: physiological, safety, love, esteem, and self-actualization (pp. 9-23). E. J. Murray (1964) commented that "the lower the motive in the hierarchy, the more crucial it is for survival and the earlier it appears in evolution (p. 111)." Emergence of any need rests on prior satisfaction of previous needs (Maslow, 1964, p. 16). Yet Maslow (1964) acknowledged preconditions for satisfaction of even the most basic needs:

> The cognitive capacities (perceptual, intellectual, learning) are a set of adjustive tools, which have, among other functions, that of satisfaction of our basic needs (p. 17).

The ultimate goal or need is that of self-actualization, that is, a desire for self-fulfillment, for the emergence of the "self."

This concept of an emergence of "self" has been widely examined and the hypothesized desire for a positive self-image, for the actualization of individual potential, emerges as a potentially strong motive once other things have been accomplished.

Reinforcement. Logan (1969) described the principle of positive reinforcement as:

> Whenever a response is closely followed in time by a reward, the tendency for that response to occur in the future is increased according to the amount, delay, and quality of the reward (p. 74).

To be effective, the reward need not necessarily be a direct outcome of the response; in fact, the organism need not even be aware of the reward in order for learning to occur. The effect of the reward is automatic (p. 74).

There are two aspects to reward or positive reinforcement. Primary reinforcements are events that function as rewards without any special training. Secondary reinforcements are events which, though initially neutral in emotional value, may acquire reinforcing powers through association with primary rewards (p. 78).

Schedules of reinforcement affect performance of responses, that is, when the reward is available for making that response. However the conditions or properties of positive reinforcement -- its amount, delay, and quality -- determine the strength of the performance it motivates. It follows that

> performance in general increases the larger the amount of the reward received (p. 90).

> A change in the amount of reward leads to a rapid change in the level of performance in the direction appropriate to the change (p. 92).

Logan elaborated further on the conditions of positive reinforcement:

> The performance of an instrumental response is poorer the longer the time of delay of reward (p. 93).
>
> The major factor determining the detrimental effects of delayed reward is the behavior that occurs in the delay interval (p. 95).

With partial reinforcement, performance, which improves more gradually, may even come to exceed the performance produced by continuous reinforcement (p. 98).

Hill (1971) summed up the principles of motivation and reinforcement:

> We know that learning (or at least learned behavior) depends on our needs and desires and on the positive and negative incentives around us. We also know that the consequences of an act are a major factor in whether we repeat that act (p. 226).

Repetition and Practice

Logan's (1969) definition of learning includes the condition of repetition or "practice". Since practice is considered a condition of learning, and learning, a condition for performance, it follows that many of the previously discussed conditions of learning and performance will in turn affect practice. These conditions can then be regarded as the conditions of learning by practice because it is through practice that performance changes as learning occurs.

Deese (1964) cautioned that "practice makes perfect" only

under certain conditions. Five factors are seen to influence change with practice (Ch. 6). Ability is the most important single factor responsible for change during practice. What people learn is limited by the innate capacity and previous experience available to them. Despite this limitation, however, other factors can make for more efficient practice. Knowledge of the results of his actions during learning enables the learner to alter his behavior to meet the criterion of the learning situation by providing feedback. Immediate knowledge of results improves practice. General feedback also influences change during practice. Lastly, the factor of participation, that is, the taking of an active role in the learning process, improves attention, and so improves practice.

One of the issues that Hill (1971) recognized as dividing learning theorists is whether they embrace a cognitive or a connectionist interpretation of learning (p. 183). While the cognitive interpretations look at the individual's cognitions about his environment and how they help determine his behavior, connectionist interpretations of learning consider the connections between stimuli and responses in learning.

Somewhere between these two positions is cybernetics which Hill (1971) describes as the application of feedback theory (p. 200). As such, it is relevant to the practice component of learning, feedback being an important condition of learning by practice. Cybernetics stresses the important role that knowledge of results plays in skilled performances.

In considering infants' play and cognitive development,

Murphy (1972) recognizes the need for feedback. "The early impulse to make something happen in the environment must be reinforced by the experience that something actually does happen (p. 124)." Only with this feedback, that is, the response or reward to the child's actions, can development proceed.

Some Theoretical Principles of Learning

In the third edition of Theories of Learning, Hilgard (1966) recognized the need to extract "principles" or generalizations that summarize accepted empirical relationships which are potentially useful in practice.

In considering the principles emphasized by each theoretical school of thought, Hilgard, (Ch. 16), stated that what emerges is not controversy over facts, but rather, different approaches to the same phenomena. Stimulus-response theory considers the conditions of performance and how it can be improved. Cognitive theory looks at factors that increase the efficiency of performance and facilitate learning. Theories of motivation and personality emphasize the individual variability of learning. These points of view offer an integrated picture of the individual as learner.

Stimulus-response theory. Hilgard found seven principles emphasized within stimulus-response theory.

1. Activity -- the importance of "learning by doing" and the significance of responses made by the learner -- cannot be stressed strongly enough.
2. Frequency of repetition -- to acquire a skill and ensure

retention of the skill -- offers the practice element required in many types of learning.

3. Reinforcement -- the rewarding of correct responses -- is an important principle.
4. Generalization and discrimination -- extending the range of stimuli to which learning will become appropriate -- emphasize the need for practice in various contexts.
5. Novel behavior can be enhanced.
6. Drive conditions -- the motivational conditions important for learning at a practical level -- do not hold true for all personal-social motives.
7. Conflicts and frustrations -- inevitable principles operating in the learning process -- must be recognized and taken into consideration (p. 562).

Cognitive theory. Equivalent principles were found within cognitive theory.

1. Perceptual features -- essential features to the solution of a problem -- should be clearly structured and presented to the learner.
2. Organization of knowledge -- from simple wholes to more complex wholes -- is essential.
3. Learning with understanding -- related to stimulus-response theory emphasis on the importance of meaningfulness and retention in learning -- is seen as more permanent and more easily transferred to new learning situations.

4. Cognitive feedback -- equivalent to reinforcement in stimulus-response theory -- helps correct faulty responses and confirms correct ones.
5. Goal-setting -- as motivation for learning -- is important for learning.
6. Divergent thinking and convergent thinking must both be nurtured in developing effective problem-solving abilities (p. 563).

Motivation and personality theory. Hilgard stressed further principles from this theoretical school of thought.

1. Abilities of the learner -- of each individual learner -- must be provided for.
2. Postnatal development -- in addition to heredity -- must be understood in order to understand what forces have influenced the learner.
3. Cultural group membership can affect learning.
4. Anxiety level will determine the effects of various encouragements to learn on individual learners.
5. Appropriate motives -- in the same objective situation -- vary with individual learners.
6. Organization of motives and values -- and their relevance to the individual -- is important.
7. Group atmosphere -- for example, competition vs. cooperation -- affects the satisfaction learning brings about as well as the products of learning (p. 564).

Summary

Hilgard (1966) reached some conclusions on the role of theory and practice in learning:

> When the practical conditions of learning have to be arranged for particular learners, there is general agreement that attention has to be paid to the nature of the learners, to careful analysis of the tasks that confront them; beyond that, there is rather general agreement on some broad generalizations from learning experiments and theory, but these are not uniquely bound to particular theoretical viewpoints, and are not very instructive in respect to specific problems of improving efficiency of learning (p. 571).

Nonetheless, for purposes of this study the generally accepted principles of learning can be summarized as follows:

1. Participation. The child should be actively involved in the learning process.
2. Repetition. Repetitive practice is important both in acquiring and in ensuring retention of learning.
3. Perception. The child's perception of the structural features of the learning situation affects his learning.
4. Maturation. Maturation is essential to learning.
5. Motivation. Learning will be more effective and more thorough if the child is motivated to learn.
6. Reinforcement. Positive reinforcement, or reward, improves learning.
7. Meaningfulness. Learning is more permanent and more transferrable if the child understands what he is learning.
8. Ability. Abilities of individual learners must be

considered.

9. Prior Experience. The learner is influenced by his prior experiences.

10. Environmental Situation. Both the process and the product of learning are affected by the situation of the moment.

CHILD DEVELOPMENT

The stated purpose of this study is to arrange the practical conditions of learning involved in games that give practice. To this end, we must move from the broad generalizations about learning just considered, to the nature of the learners as seen in child development thinking, and then on to the careful analysis of the tasks that confront them as seen in theories of play and games.

An Overview of Child Development

The discipline of child development, in Mussen's (1963) words, "is concerned with the description and explanation -- the hows and whys -- of human growth and change (Preface)." To this end, it is the intricate interrelationship of many disciplines. These interrelationships are unavoidable as child development refers not to just one simple process, but actually is a general term used to cover many specific aspects of normal child development.

Mussen elaborated on general child development as follows:

> Children not only change with age, but at any given age, they also show marked individual differences in many aspects of development (p. 3).

> All aspects of development are continuous, concurrent, and closely and intricately interrelated (p. 5).

He stated several broad principles of development in effect from the moment life begins. From those principles, the following have significance for this study:

> Development is, for the most part, orderly and proceeds in an unvarying sequence. . .
> Although development is continuous, it is not always smooth and gradual. . .
> There are critical periods for the development of certain. . . functions. . .
> The experiences at one stage of maturity affect future developments (p. 12).

The Interaction of Maturation and Learning

Having offered these general principles, Mussen (1963) addressed himself to the "how" of development:

> All the characteristics and abilities a person acquires and all developmental changes result from two basic though complex processes: learning and maturation. Since the two processes almost always interact, it is difficult to separate their effects from each other or to specify the relative contribution of each to the child's development (p. 13).

Figure 3 illustrates this interaction of learning and maturation as a basis for development.

Deese (1964) stressed that "innate and acquired determiners of behavior work together within the environment to produce the person of the moment (p. 227)." However, he maintained that while learning and maturation interlock to chart the course of development, the

limits are defined by maturation. It is precisely this close interaction between maturation and learning that ensures an orderly and regular pattern to the course of development (p. 239).

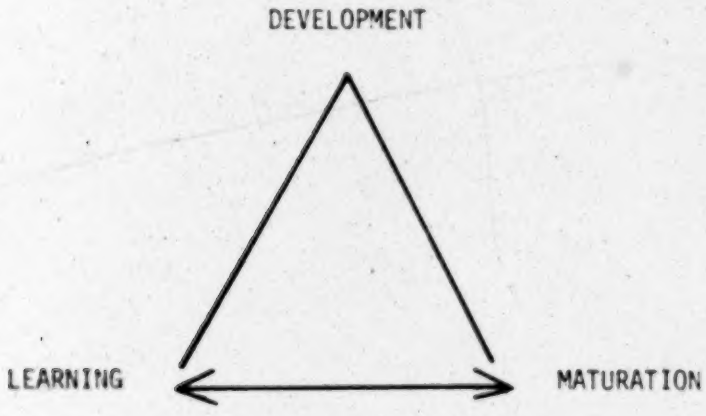


Figure 3

The Interaction of Learning and Maturation as a Basis for Development

While learning has been defined as change in behavior or performance as a result of experience (Logan, 1969, p. 2), maturation refers to development of the organism as a function of time or age (McCandless, 1961, cited by Mussen, 1963, p. 118). Mussen stated that:

> all definitions of maturation stress organic

> processes or structural changes occurring within an individual's body that are relatively independent of external environmental conditions, experiences, or practice (p. 14).

Thus, the development of skills in every area clearly depends on the interrelation of maturation and learning. The learning-maturing child is a very complex entity. This complexity can perhaps be better understood after a review of the most basic aspects of development.

The Bases of Child Development

In considering biological bases of development, we see the interrelationship of heredity and environment in determining physical characteristics. These physical characteristics, in turn, indirectly influence behavior and personality development.

Mussen (1963) defined personality as "a broad and comprehensive concept covering the organization of an individual's predispositions to behavior and his unique adjustments to his environment (p. 57)." He listed four types of influence in personality development: biological properties, cultural group membership, the individual's personal history of experiences with others, and the actual situation (p. 57). Again the complex interrelationships among these factors must be stressed.

Development of social behavior covers the child's interactions with others. Characteristic patterns of social behavior emerge at various ages and stages of social development.

The cognitive development of the child is also a conglomerate of processes which "develop concurrently, are independent and

interactive (p. 31)." Thus, cognition can be defined as follows:

> Cognition refers to the "higher mental processes," that is, to the functions involved in understanding and dealing with the world about us -- perception, language, concept formation, abstraction, problem solving, intelligence, and thinking (p. 31).

Without intending to minimize the importance of each aspect of development, one must recognize that the most widely studied aspect, and perhaps the aspect most relevant to this study, is cognitive development. As development in this particular area is essential to learning, it seems worthy of closer consideration.

Piaget on Child Development

The most comprehensive and systematic study of cognitive development is found in the work of Jean Piaget. As a developmental psychologist, Piaget concerns himself primarily with behavior changes from less to more advanced functioning. His concern led to a theory of cognitive development that saw the process of development as a sequence of qualitative stages. "The classification of stages is a means to the end of understanding the developmental process (Flavell, 1963, p. 24)." While no attempt will be made to explain Piaget's general theory of child development summarized in Appendix B, the general principles of development which Piaget expounds together with their educational applications will be discussed.

General principles of development. There are some aspects of Piaget's theory of developmental stages that can be regarded as general principles of development. A comprehensive study and explanation of The Developmental Psychology of Jean Piaget is offered

by Flavell (1963).

Development is seen to progress in an order or sequence that is the same for every individual. Piaget breaks this sequence into three major stages. The mental structures which define earlier stages become integrated or incorporated into those stages which follow. In fact, subsequent mental structures are dependent on these previous ones. The structural properties defining any given stage must themselves form an integrated whole. Only when this integration is achieved can progress be made to a subsequent stage. Each stage has an initial period of preparation and a final period of achievement. Yet similar cognitive developments can occur at different ages across the ontogenetic span described by Piaget (Flavell, 1963, pp. 19-21).

From birth, cognitive behavior is motivated fundamentally by "an intrinsic need for cognitive organs or structures, once generated by functioning, to perpetuate themselves by more functioning (p. 78)." The human organism seeks repetition as part of "the intrinsic tendency to reach out into the environment again and again to incorporate what it can (p. 79)." Thus, fundamental to the development of intelligence and perception are the "real actions performed by the subject (p. 82)." The motivational base for Piaget's theory is clearly "akin to conceptions of learning and personality which stress the importance of curiosity or exploratory drives, activity and sensory needs (p. 80)." Piaget finds the essence of this human functioning in the two inseparable and complementary processes of organization and adaptation.

The process of adaptation referred to, in turn, has two components -- assimilation and accommodation. "Assimilation is the dominant component of intelligence. And the principal attribute of assimilation is repetition (p. 79)." When a person shows assimilatory behavior, he is fitting information and/or actions into existing mental structures, which Piaget calls schemas, that classify similar behavior sequences. When a person shows accommodatory behavior, he is somehow changing or accommodating his mental structures, or schemas, to fit the situation in question. It is when these two processes achieve some degree of balance or, to use Piaget's term, equilibrium, that "a both realistic (accommodation) and meaningful (assimilation) rapport between subject and object is secured (p. 65)." This, in turn, allows for further progress in development.

In commenting on the two processes, Skemp (1972) stated that "accommodation can be difficult; whereas assimilation of experience to an existing schema gives a feeling of mastery, and is usually enjoyed (p. 44)."

Flavell (1963) recognized the primacy of assimilation over accommodation in play (p. 65). The essence of play is "assimilation for assimilation's sake (p. 126)." This makes its origins difficult to discriminate although its various stages of development are more apparent.

Some implications for education. In considering the problem of applying psychological findings to education Piaget (in Almy,

1966) maintained that:

> For most learning theorists, learning is a primary process: it is independent of development, and mental development is even considered as the sum of successive learning, and not as an autonomous total process (Foreword).

Piaget, however, sees development as accounting for learning much more than learning does for development. Maturation merely opens up possibilities; it is experience and the environmental elements that make these possibilities become actualities.

Almy (1966) applied herself to the intellectual aspects of Piaget's work -- the thinking of young children. She accepted his stages of development and listed his four main factors affecting transition from one stage to another. First there is maturation -- the increasing differentiation of the nervous system. A second factor is experience with the physical world. Social transmission as embodied in education and in encounters with other human beings is a third factor. Lastly, the factor of equilibration or self-regulation has a significant effect (p. 19).

The relationship between learning and development must also be clarified. Piaget regarded learning as a process provoked by external situations and limited in scope. Development "is the essential process and each element of learning occurs as a function of total development, rather than being an element which explains development (Piaget in Flavell, 1963, p. 19)."

Based on these findings of Piaget, Almy (1966) extracted several implications for any early childhood education program. She stressed the importance of sequence, manipulative activity, social

interaction among children, and the role of discovery (pp. 136-139)."

In the Piagetian picture of child development, Nathan Issacs (1961) considered the keys to the child's mental growth to be (1) the importance of the child's own action, and (2) the transformation of this action into a process of inward building-up (p. 9). In looking for common stages and laws of all children's mental growth, Issacs claimed that "Piaget's whole psychology rests on the principle of continuous interaction between the child and the world around him (p. 33)." This involves both maturation and environment.

The task for teachers, however, is to work out the practical implications of Piaget's research in providing optimal conditions for mental growth. To this end, Issacs elaborated some of the educational bearings of this work.

First, he distinguished between that learning which leads to actual growth, that is, the child's active doing which is cumulative in the formation of structures, and that learning which is "verbal training, habit formation, or the mechanical mastery of skills (p. 34)." While he regarded the former as "true learning," the latter also has value "as far as it provides working means and tools for the first type. If treated as an end in itself. . . it becomes worthless (p. 34)."

Second, true learning comes not only from action, but also from understanding. True learning

> depends upon children being able to integrate further elements into schemas in their minds which are integrated already and into which new elements naturally and continuously fit (p. 39).

Lastly, Issacs stressed that education should make full use of the child's natural interest and curiosity for "it must above all enable the child to carry much further what he is strongly impelled to do in any case (p. 36)."

In essence, the teacher's task is to use Piaget's structure as a framework for curriculum planning by applying "the principle of learning by wide and varied doing, understanding and integrating (p. 41)."

Piaget himself (1972) described the role of the teacher as that of someone who organizes situations that will give rise to curiosity and solution-seeking in the child. The child can more easily understand through actions than in verbal expression.

Summary

Generally accepted principles of child development can be summarized, for purposes of this study, as follows:

1. Invariant sequence. Development is orderly and proceeds in an unvarying sequence.
2. Continuous. Development is a continuous process that begins with conception, although it is not always smooth and gradual.
3. Critical periods. There are critical periods for the development of certain functions.
4. Aspects of development. The many aspects of development -- physical, social, cognitive, and emotional -- are "continuous, concurrent, and closely and intricately

interrelated (Mussen, 1963, p. 5)."

5. Prior experience. Development is affected by past experience, and the experiences of the present will affect future development.
6. Maturation and learning. The basis of all developmental change is found in the interacting processes of maturation and learning.
7. Individual differences. At any given age, children will show individual differences in development.

PLAY

In view of the summarized principles of child development and learning, the importance of play in both child development and learning cannot be minimized. Any attempt to plan for young children's learning must take into consideration the element of play for only through an understanding of this important activity of childhood can we hope to utilize its powers to further our teaching and learning goals.

An Overview of Play

A definition of the term "play" is the logical beginning point for any discussion of play. However, this is no simple matter. Ellis (1973) admitted that "linguistically play presents a problem (p. 11)," entailed in its reduction of the complex structure of human play to some simple construct. Yet play is a higher-order concept that covers many diverse behaviors. "Behaviors then are defined not as play but playful. . . and we are left with the

problem of discriminating playful from non-playful activities (p. 21)." Despite the many possible meanings, play most often suggests activity that is pleasant and voluntary, and easily discriminated by the majority of people. To this we will add Ellis' point that play must be defined to fit the current concept of play behavior (p. 21).

A review of the various theories of play set out in Appendix C shows how each theory offers an explanation to fit the contemporary society. Consequently,

> we now accept without question the child's right to play. We are deeply concerned with the manner in which the child plays, the materials he uses, and what happens to him if he does not play (McLellan, 1970, p. 4).

The problem as Ellis (1973) sees it is that

> there is little or no satisfactory body of theory concerning the motive to play, and hence what play really is, existing in the minds of those making decisions influencing the play behavior of our people (p. 6).

Those involved in the management of play must be given some technological knowledge about play if they are to prepare adequately for its nurturance.

Play, as has already been stated, is a difficult phenomenon to understand and define. The many theories of play that have been put forward all have their weaknesses (see Appendix C). Piaget (1951) suggested that:

> the reason for the difficulty lies perhaps in the fact that there has been a tendency to consider play as an isolated function. . . and therefore to seek particular solutions to the problem, whereas play is in reality one of the aspects of any activity (p. 147).

Piaget extracted six frequently used criteria to distinguish play from non-play activities. First, there is the view that play is an end in itself. The second criterion is spontaneity. Third, play is an activity for pleasure. The relative lack of organization found in play is a fourth criterion. The fifth criterion is the freedom from conflict that exists in play. Lastly, the criterion of overmotivation is suggested (pp. 147-150).

Piaget on Play

Piaget (1951) explained children's play

> not by specific causes peculiar to the realm of play, but by the fact that the characteristics of all behavior and all thought are less in equilibrium in the early stages of mental development than in the adult stage (p. 147).

Piaget considered play sufficiently important in development that he devoted a whole volume Play, Dreams, and Imitation in Childhood (1951) to his ideas on the subject. He stated that

> if every act of intelligence is an equilibrium between assimilation and accommodation, while imitation is a continuation of accommodation for its own sake, it may be said, conversely, that play is essentially assimilation, or the primacy of assimilation over accommodation (p. 87).

In attempting to define or describe play, Piaget declared that play

> proceeds by relaxation of the effort at adaptation and by maintenance or exercise of activities for the mere pleasure of mastering them and acquiring thereby a feeling of virtuosity or power (p. 89).

These assimilatory behaviors, or repetitive schemas, will result not only in play or games but also, "once acquired, they may equally

well become parts of more complete adaptations (p. 90)." Thus we have the situation of a child repeating a known, previously learned action purely for the pleasure of doing it. The initial result is play behavior -- an example of assimilation. Yet, in time, this particular play-action becomes so well integrated into a particular schema that it can help achieve some further accommodation. In turn, the newly adapted behavior can be exercised. Once again, "this activity is no longer an effort to learn, it is only a happy display of known actions (p. 93)." The child continually uses familiar schemas in a game context, and most often assimilates new problems to previously learned schemas.

The classification of play. Most authors who attempt to solve the complex problem of classifying play have in mind only those particular play activities and games which correspond to their own explanation of play and ignore the vast majority of cases that do not fit their preconceived ideas (Piaget, 1951, p. 105).

Piaget listed four criteria for classifying play in games: (1) the content of the game, (2) the special function of the game, (3) the origin of the game, and (4) the structures presented by each game (Ch. 5). It is this last criterion upon which Piaget elaborated. He concluded that there are three main types of structure which characterize children's games and in turn determine how these games can be classified as practice games, symbolic games, and games with rules (p. 110).

Practice games appear first. "These games exercise the

structures for no other purpose than the pleasure of functioning (p. 110)." Next, the symbolic games emerge at the level of deliberate make-believe. Games with rules, where the rules are specifically made for the purpose of the game, are last in the sequence.

Play and Education

In education, the problem of play increases in complexity for "the boundary between play and education is rapidly becoming blurred (Ellis, 1973, p. 4)."

> Education is coming to recognize that playful behavior is often motivated by an intensive desire to learn that is accompanied by positive feelings of enjoyment and much learning (p. xii).

The popular view of play as being simple and unimportant was countered by Weininger (1972-73). He holds that play is the child's major way of learning and as such it operates to increase the cognitive functioning of children:

> First, play extends the exploratory drive of children. . .
> Second, play increases the sensory input which in turn increases cognitive awareness of the environment. . .
> Third, play is a major achieving pattern of children. . .
> Fourth. . .play increases a child's creativity (pp. 6-7).

Hartley (1971) considered play "the essential ingredient" in any early childhood education program. This powerful, spontaneous, and absorbed activity of childhood offers "both the variety and the chance for repetition (p. 81)" that are necessary

to ensure mastery in learning. If only for this reason, we must improve our understanding of it. Yet, in addition,

> the core of play, the child's own intrinsic absorption in mastery, continues to provide energy for the learning enterprise. The ability of the teacher to prepare an evocative environment and to utilize the teachable moment gives guidance and form (p. 84).

Scarfe (1962) considered play more than merely an ingredient in education. For him, play is education in its finest form. He argues this point of view most effectively and deserves a full hearing.

> Play has, in fact, all the characteristics of a fine and complete educational process. It secures concentration for a great length of time. It develops initiative, imagination and intense interest. There is tremendous intellectual ferment, as well as complete emotional involvement. No other activity motivates repetition more thoroughly. No other activity improves the personality so markedly. No other activity calls so fully on the resources of effort and energy which lie latent in the human being. Play is the most complete of all the educational processes for it influences the intellect, the emotions and the body of the child. It is the only activity in which the whole educational process is fully consummated, when experience induces learning and learning produces wisdom and character (p. 72).

Herron and Sutton-Smith (1971) stress that play must be considered not only as a behavioral phenomena, but also as a developmental one with its own distinctive sequences (Ch. 7).

McLellan (1970) found twentieth-century observers of children's play to be in agreement on this one point -- that the play of children is developmental in nature. Five developmental characteristics elaborate this point as follows: (1) children

have ways of behaving that are peculiar to children; (2) children's play differs from year to year; (3) as in other activities of childhood, there are clearly defined stages of growth in play; (4) play provides stimuli for the development of intelligence; and (5) play is an aid to the mental health and well-being of children (p. 35).

Frank (1963) claimed that "play helps the child learn what no one can teach him (p. 4)." The crucial significance of such childhood experiences is emphasized in his statement stressing the importance of "what we provide for children's play -- space, time, equipment and play materials. . . so that at each stage of his development he can learn in his way what is necessary and desireable for him (p. 5)."

Hartley and Goldenson (1957) followed Frank's advice that "to understand how the child matures. . .is the key to understanding children's play (Introduction, p. ix)." To this end they considered the development of children's play by following the development of the child from birth. From the child's point of view, they found no difference between play and useful activities. The passion of the young child is for mastery and this is achieved through learning and repetition (p. 63). It bears emphasis that "the best and most lasting learning takes place when the learner is enjoying what he is doing (p. 2)."

In the first year, play begins as soon as the infant enjoys sensation (Ch. 1). The second year finds the child encountering frustration for although he can do many things easily and smoothly,

his intentions run ahead of his abilities (Ch. 2). From age two to three, despite his ability to concentrate on quiet tasks, the child prefers action. Learning and repetition dominate his play as he strives to master all that is familiar in his environment (Ch. 3). By the age of three, the child seeks variety in his play experiences. He now needs to play with other children even though adult help and guidance is required in learning to manage his relationships with these others. He is beginning to develop self-control and imagination, and his attention span is lengthening (Ch. 4). At four years of age the child senses the vast gaps between his needs or desires and his skills and power to attain these. He therefore sets out actively to conquer the world about him. He now has "enough mastery of detail and a long enough attention span to play games with tolerant adults. . . the number of subjects being limited only by the child's experience (p. 111)." Hartley and Goldenson suggest a variety of homemade boards and cards as appropriate games for this age (Ch. 5). By age five the child takes a keen interest in the here and now. He can concentrate for long periods of time and can play co-operatively with other children. "Almost all his play is devoted to learning and it has the quality of practice or rehearsal rather than invention (p. 115)." Since his interests and experiences are rapidly expanding, adult help and resources are needed. Although he is not yet ready for strong competition, he enjoys games: "games in which everyone has a turn. . . in which words and movements are repeated with every turn (p. 129)." Hartley and Goldenson propose games of this type as the ideal way to reinforce

the child's interest in numbers and letters but caution that "Five will glow under praise; criticism, even when well meant, will wilt him (p. 133)." The child of six is still not ready for strongly competitive games as his understanding of rules is not yet fixed. Thus "the best competitive games for Sixes are those which have simple rules, and do not require close teamwork (p. 150)." By seven years of age the peer group and other children take on new importance. He enjoys group games and insists on fairness in them. However, although he accepts the existance of rules, he is still uncertain as to just how they operate and so, adult help is still required to supervise children's games though to a lesser degree than formerly. Also, because the child can now understand the meaning of rules somewhat better, and is a more graceful loser, his repertory of table games can be expanded (Ch. 8).

Millar (1968) found that "teachers increasingly accepted the idea that education should take account of the child's natural interests and stages of development (p. 13)." However, because all children of the same age are not always at the same stage of development, McLellan (1970) cautioned that the teacher must plan activities and organize the classroom to bridge this gap, so that all the children are presented with stimulating play situations.

Summary

Most explanations of play are unsatisfactory because "the same set of conditions does not necessarily apply to every instance of play (Millar, 1968, p. 58)." However, any study that hopes to

influence the play behavior of children must adopt some working explanation of play. To this end, Ellis (1973) proposed that

> the most satisfying explanation of play seems to involve an integration of three: play as arousal-seeking, play as learning, and the developmentalist view of the child. This integration uses inter-relationships between the motive for play, the constraints placed on expression of playful responses by the environment, and the effects they work on the complexity of children to play behavior (p. 119).

For purposes of this study then, the following principles of play can be summarized:

1. Natural and spontaneous. Play is a natural and spontaneous activity of childhood.
2. Performance. Play is one aspect of behavior or performance.
3. Arousal-seeking. Play is an arousal-seeking activity.
4. Intrinsically motivated. Play behavior is sustained by intrinsic motives such as pleasure, mastery, power, curiosity, exploration, and creativity.
5. Learning behavior. Play can be learning behavior.
6. Developmental. Play is developmental in nature.
7. Individual variability. Play behavior varies with each child.

GAMES

Games are most often a form of play and as such, must be considered a factor in young children's learning and development.

> There is no denying the universal appeal for the vast majority of children, at least up to the age of about eleven or twelve, of games in their widest sense. To

> engage in what is essentially a play situation is always attractive and exciting, and the unpredictable nature of many games is a characteristic to which children readily respond. Furthermore, they enjoy any activity which allows them to exploit and demonstrate skill, and all competitive games abound with such possibilities (Mauldon and Redfern, 1969, p. 1).

An Overview of Game Theory

Before games can be applied to education with any degree of assurance, some consideration must be given to what little technological knowledge is available, that is, to game theory. Since the term "game" can cover an almost infinite number of situations, certain lines of demarcation must be drawn if one wishes to focus on the relatively narrow range of games that fall into the realm of learning activities.

A definition of games. The many possible dimensions of games, as well as the diverse assumptions made by those who attempt to classify games, make an acceptable definition of games most elusive. However, a consideration of the working definitions offered by Caillois (1971), Gordon (1970), and Avedon and Sutton-Smith (1971) produces the common elements of some form of play or control system, players, constraints such as rules, equipment and required skills, and an objective such as winning. Thus, for purposes of this study,

> a game is an exercise of voluntary control systems, in which there is a contest between powers, confined by rules in order to produce a disequilibrial outcome (Avedon and Sutton-Smith, 1971, p. 405).

The classification of games. There are many ways of

classifying games and each classification rests on certain basic assumptions. In reviewing these bases of classification Avedon and Sutton-Smith (1971) derived three classes from Culin -- chance, dexterity, and calculation. Rapoport (1960) discussed game theory in similar terms, that is, strategy, chance, and skill of the player. This type of classification assumes universal concepts as a basis for games. Other bases of classification focused on the artifacts used in playing the game, for example, balls, nets, animals etc. . . Still other taxonomies cited by Avedon and Sutton-Smith (1971) were based on human activities, as in the work of H. J. R. Murray, and later, of Bell. Bell (1966) considered board and table games only, and his taxonomy included race games, war games, positional games, mancala games, dice games, and domino games (p. v). The universal concepts at the base of these games are strategy and chance. Game theorists also classified games according to the number of human players and according to the "pay-off" or results (Avedon and Sutton-Smith, 1971, p. 403).

> Games may be grouped into three classes on the basis of outcome attributes: (1) games of physical skill, in which the outcome is determined by the players' motor activities; (2) games of strategy, in which the outcome is determined by rational choices among possible courses of action; and (3) games of chance, in which the outcome is determined by guesses or by some uncontrolled artifact such as a die or a wheel (Roberts and Sutton-Smith, 1971, p. 466).

In addition to these three attributes, Gump and Sutton-Smith (1971) classified games in terms of the role relationships they involve, and focused on central-person games in which power is ascribed rather

than achieved. Yet these games all have in common some form of a contest for power. Thus Avedon and Sutton-Smith (1971) found a consensus among the authors they surveyed: "we have four basic types of games: games of arbitrary power, skill, strategy, and luck (p. 404)." They suggested that these changes in the classificatory emphasis may be a necessary reflection of the changes that occur in games as children grow and develop.

The dimensions of games. Redl, Gump, and Sutton-Smith (1971) listed those dimensions of games thought relevant to the behavior that games may provoke. "The presence or absence of these dimensions presumably should be a factor in determining which games are suitable for the needs and capacities of different groups of children (p. 408)."

Since the games to be considered in this study are board games and card games that complement learning that goes on in the classroom, only those dimensions of games thought relevant to this study will be considered.

The relevant dimensions of games listed by these authorities are briefly summarized as follows:

1. Bodily activity. This exists even though these games involve minimal body contact. Locomotion is restricted, but manipulative opportunities with markers, dice, cards, etc. . . abound, as do opportunities for vocal expression during play.
2. Skill requirements. As the exercise of skill is one of the main objectives of the game, skill requirements are

of high importance. The required skills are mostly in the cognitive domain and are one of the determiners of game success.

3. Chance. Chance is also a determiner of success and it is a guiding element in most games involving dice, spinners, etc. . .
4. Competition factors. While present in varying degrees of intensity, competition factors should be goal-directed rather than opponent-directed, and should aim for self-enhancement rather than defeat of the "other."
5. Space. Large amounts of space are not needed, space requirements usually being defined by the size of the game board or the card table surface.
6. Time. Time is marked by various rewards and penalties within the game from the moment play begins as well as by the natural termination point of the game.
7. Props. There is minimal use of props, and those props used rarely involve more than game board, cards, place markers and counting device.
8. Role taking factors. These exist in the decision as to who will go first, and in some games, who will take on the additional role of dealer or caller.
9. Rule complexity. The complexity of the game rules can "increase demands on the comprehension of participants, . . . enrich game experience, . . . and cause unexpected advances or reversals (p. 412)."

10. Participation. This occurs on two levels: active participation during one's turn, and in-[redacted]iting for one's turn.
11. Leeway for marginal impulse expression. Joking and "horseplay" will not interfere with game progress.
12. Suspense emphasis. This is possible and builds up at various points during play.
13. Pleasure-pain content of winning and losing. Included in this dimension are "loss of possessions, . . . implications that one is inadequate skillwise, . . . implication that Destiny is against one (p. 414)."
14. Winnership. It is possible to spread winnership among the players so that there are several winners or degrees of winning such as first, second, and third.
15. Penetration of game by rewards and penalties. This can also cause advances or reversals of game success.
16. Trust dependence. If all players understand and observe the rules of the game, this is a minor element.
17. Personalization of game props. A form of personalization exists in the markers representing each player on the game board, and the cards dealt each hand in a card game.
18. Introduction of ritual to game. A security factor is created by introducing ritual to a game and is especially popular in games involving young children.
19. Outcome clarity. This is usually obvious in games of this type (pp. 408-418).

The structural elements of games. Avedon (1971) asked: "Are there certain structural elements that are common to all games, regardless of the differences in games or the purposes for which the games are used, or the culture in which they are used (p. 420)?" To answer this question he looked for "invariant elements" in game structures. By combining the work of the mathematicians and the behaviorists, he identified seven elements in games:

1. Purpose or raison d'etre.
2. Procedures for action.
3. Rules governing action.
4. Number of participants.
5. Roles of participants.
6. Participant interaction patterns.
7. Results or pay-off (p. 422).

To these he added three game elements espoused by personnel in the field of recreation: "the abilities and skills required for participation, . . . the environmental requirements and necessary physical setting, and the required equipment needed for participation in a game (p. 422)." He offers these ten elements for present consideration (see Appendix D), but considers them only a preliminary excursion into the structure of games.

A Developmental Approach: Piaget on Games

The discussion of child development in a previous section brought to light the important role of play in child development. Jean Piaget (1951) considered this crucial aspect of child development by studying children's play in games. He developed not only his own explanation of play, but also a classification of games which takes into account their evolution from rote practice

to complex forms of play involving sets of rules. Furthermore, he illustrated the importance of play in development through the correspondence of the classes of games with the successive stages of cognitive development.

Classification of games. Piaget (1951) classified games according to their structure, and as in other areas of development, these structures form an invariant hierarchical sequence.

> Practice, symbol, and rule then seem to be the three successive stages which characterize the main classes of games from the point of view of their mental structure (p. 113).

Furthermore, these three classes of games correspond to the three successive stages in the development of intelligence: sensory-motor, representational, and reflective.

Practice games have been described as those which exercise structures purely for the functional pleasure of use. However, although this "functioning for pleasure" is the child's first form of play, it is not abandoned when the sensory-motor period of development ends. This practice element is found in the acquisition of any new skill, throughout childhood. Piaget stated that

> as each behavior is in process of construction and adaptation, there is functional assimilation, or practice for the sake of practice, accompanied by the pleasure of "being the cause" or the feeling of power (p. 113).

Practice games themselves develop in three substages and can be classified accordingly. First, there are practice games that consist of mere reproduction of a previously mastered behavior. Second, there are practice games which result in fortuitous

combinations, so that the activity being practiced acquires some new combinations which chanced to occur during the practice. Third, there are practice games in which intentional combinations occur and become part of the game (pp. 114-118).

Symbolic games occur when the child becomes interested in the things symbolized and the practice itself becomes symbolic. "Towards age four comes the ability to anticipate the consequences of the reproduced actions (p. 135)." This period of game behavior finds order and coherence of thought, and progress in socialization, as two interacting aspects of the same development.

Rules are defined as a group-imposed regulation whose violation carries a sanction (p. 112). Gradually "the rule replaces the symbol and integrates practice as soon as certain social relationships are formed. . . for games with rules are the ludic activity of the socialized being (p. 142)." It is these games that continue into adulthood. To quote Piaget:

> Games with rules, then, are games with sensory-motor combinations (races, marbles, ball games, etc. . .), or intellectual combinations (cards, chess, etc. . .), in which there is competition between individuals (otherwise rules would be useless) and which are regulated either by a code handed down from earlier generations, or by temporary agreement (p. 144).

The rules of a game. In considering the moral judgement of the child, Piaget (in Flavell, 1963) explored children's ideas and attitudes about rules. Using a game of marbles as a base, he investigated children's conformity to rules as well as their verbalized understandings about rules. As with the development of

intelligence, he found stages in the development of both conformity to, and understanding of, the rules of a game.

The stages of development of conformity to the rules of a game are fourfold. Stage one involves free play with game materials without any attempt to adapt social rules. Stage two, (reached at about three to five years of age), begins with imitation of the rule regulated play behavior of elders, but in a socially isolated way, unintentionally breaking the rules at every turn. Stage three, (arrived at about seven or eight years of age), finds the child beginning to adhere to the mutually agreed upon set of rules and playing in a genuinely social way. Even at this stage grasp of rules and conformity to them is still vague and approximate. Finally, in stage four, (at about eleven or twelve years of age), rules are understood fully and enforced rigidly (pp. 291-292).

Piaget found three stages in the development of the child's understanding of rules. In stage one, rules are simply not in evidence. However, by stage two, (which corresponds to stages two and three in the development of conformity to rules), rules are regarded as "eternal and unchangeable, stemming from parental or divine authority (p. 292)." While this holds in theory, rules are still broken constantly in children's actual game behavior. Stage three, (reached at about ten or eleven years of age), finds the attitude that "rules may be changed, provided only that others agree to abide by them (p. 292)." Accompanying this attitude towards rules in theory is a scrupulous adherence to rules in practice. This in turn affects the role games with rules can play in education.

Games and Education

In education, games have always garnered much enthusiasm, usually justified by the explanation that students learn by playing games. However, the current emergence of games in the classroom "can only be understood in terms of new developments in educational theory and a trend towards curriculum reform sweeping many areas of education (Carlson, 1969, p. 15)." These games, which Gordon (1970) refers to as serious games "have as their primary purpose something other than the entertainment of the players (p. 3)."

The effectiveness of games for learning. It is now recognized that the child's intense involvement in play can be channeled into education. Thus, games have been welcomed as a useful technique in the learning process, for a game is attractive in and of itself, and not because of the subject matter it contains (Levine, 1968). Abt (1967) finds that educational games which emphasize learning, rather than winning, are themselves winning converts. "There is no question that games, when properly used, can have value (Carlson, 1971, p. 338)" for games are diverse enough to satisfy several teaching and learning objectives simultaneously. Their unique characteristics can facilitate the achievement of educational goals that conventional media often fail to fulfill (Gordon, 1970).

While few can deny that games have strong motivational value, their worth as more effective teaching tools has yet to be established (Carlson, 1971). "The few studies that have been made fail to confirm that students learn anything from games that they could not have learned from conventional methods (p. 320)." It can

be argued, however, that games may produce other effects that have not yet been studied by researchers.

Teachers must not be hindered by this absence of adequate evaluation research. There are many practical considerations for the use of games and these are sufficient cause to use them (Gordon, 1970). Gordon held that if games motivate, even if it is only when they are new to the class, then teachers should capitalize on them (p. 161). Tansey and Unwin (1969) argued that games justified themselves merely by offering an alternative (p. 75). Not unimportant considerations are the ability of games to solve motivational problems for students and management problems for teachers, in addition to the fact that

> the students enjoy themselves more while they are playing than when they are not. . . so that whatever they learn (whether it be as much as usual or less), is learned with enjoyment (Avedon and Sutton-Smith, 1971, p. 315).

In considering the role of play in cognitive development, however, Sutton-Smith (1971) looked at research into play as learning and found some evidence for the effects of games on learning. Research seemed to indicate that "games result in greater improvement than occurs when control groups receive the same training from more orthodox workbook procedures (p. 256)." Also indicated are social improvements in the players due to the exercise of self-control required in playing a game. To this end, he concluded that there is evidence to suggest a functional relationship between play, games and cognitive development, albeit a loose one (p. 258).

The advantages of games. The advantages or value of games are widely recognized in education. Essentially, they are an effective bit of educational technology. This effectiveness is largely due to the fact that they are intrinsically motivating. It follows from the review of game theory that "games are intrinsically motivating because the form is characterized by several dramatic features that are independent of the subject or issues dealt with (Gordon, 1970, p. 19)." Certain basic human traits account for student involvement in games, not a particular interest in the subject of the game. Learning occurs as a by-product of playing the game. For the player, the goal is to win.

Gordon elaborated on these motivating features that characterize the game form as follows:

1. Active participation. Games are an active process and require the child to participate in the learning process.
2. Responsive. Games are responsive in that there is intrinsic and prompt feedback at every turn thus providing a valuable reinforcement to learning.
3. Goal-directed. The winning aspect of games offers goal-direction toward a clearly defined objective as well as a natural end point.
4. Open-ended. The actual outcome of the game is uncertain and open-ended.
5. Relevance. Games offer a real and relevant situation in which students can apply newly-acquired knowledge.
6. Social interaction. The opportunity for social interaction

and peer learning is always present.

7. Competition. Natural inclinations to compete are channeled for educational purposes.
8. Self-image. Self-image is improved through fresh opportunity to participate and to achieve.
9. Non-threatening. The make-believe element of games makes them less threatening to the learner than more conventional learning techniques (pp. 19-26).

Iona and Peter Opie (1969) considered the appeal of games from the child's point of view. After observing many children's games they concluded that games have rules, and in each game there is a contest. This contest is decided by both skill and luck.

> Indeed children like games in which there is a sizeable element of luck, so that individual abilities cannot be directly compared. They like games which restart almost automatically, so that everybody is given a new chance. They like games which move in stages, in which each stage. . . is almost a game in itself . . . In these games children gain the reassurance that comes with repetition, and the feeling of fellowship that comes from doing the same as everyone else (p. 2).

Yet games need not be recognized as effective just because of their motivational appeal. Games can also play a role in growth and learning. Gordon (1970) emphasized games that function to develop problem-solving abilities and cultivate an understanding of process. However, she pointed out that "games can be designed simply to convey information. . . they exploit the game's motivational or "fun" attributes more than its cognitive potential (p. 27)." Thus, Gordon elaborated several growth and learning features of

games as follows:

1. Information. The foundation of any game is information or facts.
2. Comprehension. Understanding how a game functions and the results of one's actions involve comprehension.
3. Judgement. The player often must analyse and synthesize the available facts to help determine possible courses of action.
4. Verbal and interpersonal skills. Because games involve dealing with other people, these skills take on new importance.
5. Flexibility. Games develop a flexibility in approach to problems that encourages transfer or application of learned concepts.
6. Socialization. There are many social benefits to using games. "Educational games can add depth to the socialization process in the classroom. Game situations emphasize interpersonal relations; they encourage self-restraint and attention to the needs of other individuals (p. 32)." Games help develop a respect for rules. They loosen inhibitions as normal relationships are suspended and they encourage and elicit active behavior (pp. 26-32).

Additional advantages of games are the large range of skills they can encompass, larger than can a teacher's class presentation (Coleman, 1971, p. 325). Games also offer an opportunity to practice

what has been taught, that is, an opportunity for interesting repetition and drill (Wagner and Hosier, 1960). They integrate classes of diverse ability levels and allow students to interact on an equal footing, for there is no guarantee that students of higher ability will necessarily win the game (Gordon, 1970, p. 44). The role of the teacher changes in a game from that of judge and jury to that of coach and helper (Coleman, 1971, p. 324). The teacher no longer dominates, but rather, puts her superior knowledge to work helping students to perform better (Gordon, 1970, p. 104).

Eifermann (1971) proposed the factor of "the challenge offered by the game" as concerns culturally approved games. However, a game only presents a meaningful challenge to the child if he possesses both the skill and understanding required for playing it. Inherent in all rule-governed games is the intellectual challenge of having to master the rules and consistently observe them. In competitive rule-governed games there is, in addition, "the vital challenge of attaining intersubjectively recognized distinction, both the good feeling of being able to excel and the prestige, admiration and envy from fellow players (p. 287)."

The limitations of games. Games also possess certain inherent limitations. Carlson (1971) suggested, first, that games offer an artificial simplification of real life. Second, he stated that games are "vulnerable to abuse, particularly in the hands of inexperienced or lazy teachers (p. 338)." Third, competition may lead to an excessive emphasis on winning and de-emphasize the learning

objectives. Jenkins (1963) cautioned against allowing competition to destroy the eagerness of play. If it results in the rejection of a child, competition can become destructive. This is in keeping with Gordon's (1970) questions: "can games be too motivating?" with the result that involvement becomes too tense, and "do games teach the "wrong" values?" The answer to these questions is that we must use games appropriately if we wish to gain what advantages they offer (p. 32).

The role of games in education. Having considered the various advantages and limitations of games in education, the question now arises as to the particular role that should be assigned, and what criteria should be applied to their use. Today's teacher must choose carefully from many different techniques and materials if she is to make a particular learning situation a rich experience that meets the diverse needs of individual children. There is sufficient support for the use of games that they can be considered valid learning materials. To quote Wagner, Alexander, and Hosier (1959):

> Instructional games, judiciously used, will find children giving undivided attention to the task at hand. These games will facilitate learning for a pupil while rewarding him in terms of interest and a variation in what is sometimes a monotonous routine (p. 4).

It must be stressed, however, that games are not intended as a substitute for other learning activities. They are considered an integral part of the teaching-learning process, and as such are just one of many approaches to learning. Their role is a complementary,

rather than a supplementary one.

The games that this study intends to focus on are simple games designed to exercise this complementary function, that is, to reinforce what has been taught, to fix learning, and to develop skills as an aid to further learning. They are intended as an efficient device to help children learn in an enjoyable way.

> Some games are designed primarily for motivational purposes. . . These games. . . provide a way for students to get practice. . . without the drudgery of writing out numerous workbook exercises (Gordon, 1970, p. 40).

By using these simple games to help teach sets of facts, students can be motivated to learn what would be dull to study in more conventional form. In a game situation, educational material can be made critical to the game and students who wish to play the game must learn this material. Once they have a basic understanding of the particular material or skills necessary for game participation they can then play the game, and in doing so practice this particular new piece of learning. It is still the teacher who must "teach" the material, not the game. The game helps the student learn in a meaningful and more lasting way what has been taught.

Summary

Principles of games can be summarized for purposes of this study as follows:

1. Intrinsic motivation. Games are intrinsically motivating and this accounts largely for their appeal.
2. Participation. Games involve active participation which

helps develop a self-concept of "doer" and "achiever" in the learner.

3. Reinforcement. The responsive nature of games is reflected in the intrinsic and prompt feedback they provide.
4. Competition. The clear objective of winning provides a competitive element, as well as goal-direction.
5. Skill, strategy, and chance. These three elements combine to determine game success leaving the final outcome open-ended.
6. Rules. Game action and behaviors are governed by rules.
7. Socialization. Games provide opportunities for social interaction and peer learning.
8. Learning. Skill and/or factual information are the basis of most games.
9. Development and growth. Games can both reflect the developmental process and enhance further development.

SUMMARY

This chapter surveyed relevant literature in the fields of learning, child development, play, and games for the declared purpose of extracting theoretical principles. A summary of the main principles that resulted from this review of literature can be found

in Table 1. A more eloquent summary, however, is offered by Weininger (1972-73):

> To play, to explore, to imitate, to manipulate, to experiment, is not only in the finite to learn, but also, in the infinite, to be (p. 12).

TABLE 1

SUMMARY OF RELEVANT PRINCIPLES

CHILD DEVELOPMENT	LEARNING	PLAY	GAMES
Sequential and continuous.	Active participation.	Natural and spontaneous.	Intrinsic motivation.
Individual differences.	Prior experience.	Performance.	Participation.
Critical periods.	Meaningfulness.	Arousal-seeking.	Reinforcement.
Aspects of development: social, physical, cognitive, and emotional.	Motivation.	Intrinsic motivation.	Competition.
Maturation and learning.	Repetition.	Individual variability.	Rules.
Environmental situation.	Reinforcement.		Skill, strategy and chance.

CHAPTER 3

PROCEDURE FOR COLLECTING DATA

Before basic game forms can be identified or adapted for learning, certain data must be collected. The following steps will be taken to obtain these data:

1. State relevant principles of child development, learning, play, and games from an analysis of those derived in Chapter 2.
2. Establish criteria for selecting games based on these principles.
3. Classify and examine representative existing games that meet these criteria.

This will provide a basis to extract the basic game forms from those existing games and to adapt these basic forms for different specific teaching purposes.

THEORETICAL PRINCIPLES

To find the theoretical principles of child development, learning, play, and games, that are relevant to this study, one must seek the interrelationships that exist. These interrelationships can be illustrated as the areas of overlap for these disciplines, as seen in Figure 4. It is from these overlapping areas that the relevant theoretical principles are derived. Table 1 listed the

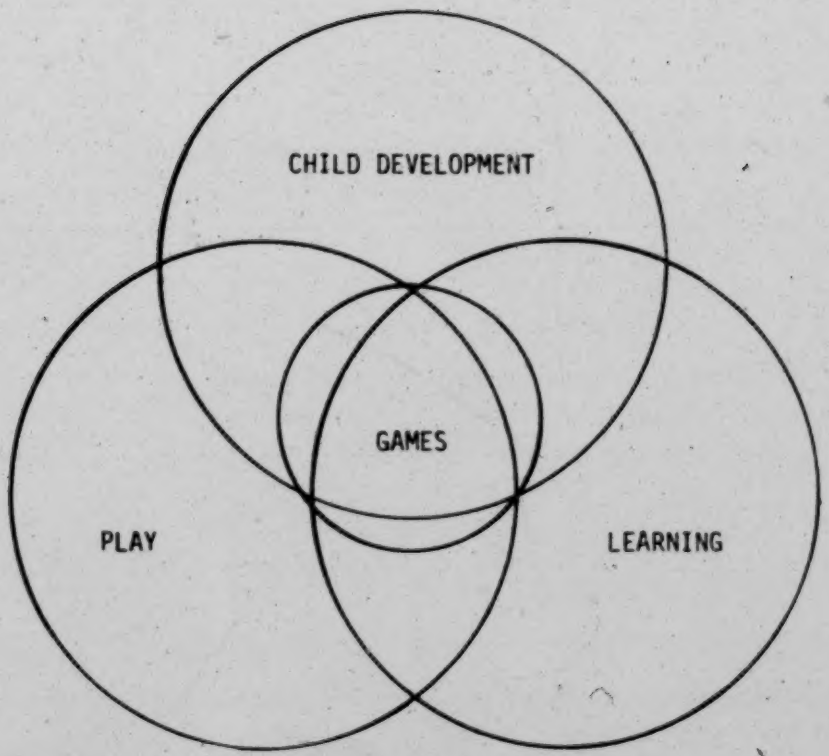


Figure 4

The Interrelationship of Learning, Child Development, Play and Games

separate principles for child development, learning, play, and games, but areas of overlap do exist and for purposes of this study, these principles must be consolidated into one set of principles. It bears repetition that a stated purpose of this study is to show that games, intended to give practice which consolidates learning of skills or facts already taught, are educationally sound. The ultimate concern of this study is to extract open game forms, that is, forms that possess only the basic mechanism of the game and are thus open to adaptation for specific teacher-defined purposes. This goal must be kept in mind in the selection of theoretical principles. The following set of principles, derived from an analysis and synthesis of Table 1, is thought relevant to this purpose.

Motivation

Motivation is a principle of learning, play, and games. If a child is motivated to learn, learning will be more effective and more thorough. Play behavior is sustained by intrinsic motives such as pleasure, mastery, power, curiosity, exploration and creativity. The appeal of games is largely explained by their ability to provide intrinsic motivation. The combination of skill, strategy, and chance to determine game success, leaving the final outcome open-ended, contributes to this intrinsic motivation. The competitive element with its clear objective of winning ensures goal-direction.

Participation

Another principle of learning, play, and games is

participation. The child should be actively involved in the learning process. Play behavior, natural and spontaneous by definition, is in many ways synonymous with participation. It is an arousal-seeking activity. Similarly games, by their very nature, require active involvement of the participants.

Reinforcement

What follows any act determines whether or not the act will be repeated. Learning is improved by positive reinforcement or reward. The responsive nature of games provides intrinsic and prompt feedback which acts as reinforcement.

Repetition

Acquisition and retention of most types of learning requires repetitive practice. Play behavior often involves repetition and to a certain extent, the rules of a game set down a repetitive pattern or ritual to which every player is required to adhere.

Individual Variability

Development, learning, and play behavior all reflect individual variability. At any given age, children will be at different stages of development. They will also vary in the different areas of development -- physical, social, emotional, and cognitive -- despite the intricate interrelationships that exist. This variability can partly be accounted for by the child's prior experience. It is also explained by the environmental situation of the moment, and by the meaningfulness the situation has for the

child. Similarly, play behavior and learning ability vary with individual children. Learning is more permanent and more transferrable if the child understands what he is learning. A third factor explaining individual variability is the interaction of maturation and learning. Although development is a continuous process of unvarying sequence, it is not smooth and gradual. Critical periods exist for the development of certain functions. The basis of developmental change thus lies in the interaction of maturation and learning.

Summary

The interrelationship of the principles of motivation, participation, reinforcement, repetition, and individual variability, for child development, learning, play, and games, is charted in Table 2.

CRITERIA FOR SELECTING GAMES

On the basis of this set of interrelating principles, found in Table 2, criteria for selecting games can be established. The task is to seek out what the actual criteria are and how they operate. To this end, the following criteria have been established.

Motivation

Criteria of motivation operate intrinsically in any game. They include the criterion of competition, the criterion of suspense, the criteria of skill, strategy, and chance combinations, and the criterion of interest. The competitive element of a game offers

TABLE 2

INTERRELATIONSHIP OF RELEVANT PRINCIPLES

<table>
<tr><th>PRINCIPLES</th><th>CHILD DEVELOPMENT</th><th>LEARNING</th><th>PLAY</th><th>GAMES</th></tr>
<tr><td>MOTIVATION</td><td></td><td>extrinsic or intrinsic</td><td colspan="2">intrinsic</td></tr>
<tr><td rowspan="2">PARTICIPATION</td><td rowspan="2"></td><td>contrived</td><td colspan="2">natural and spontaneous</td></tr>
<tr><td colspan="3">active involvement</td></tr>
<tr><td rowspan="2">REINFORCEMENT</td><td rowspan="2"></td><td colspan="2">positive</td><td>positive or negative</td></tr>
<tr><td>extrinsic or intrinsic</td><td colspan="2">intrinsic</td></tr>
<tr><td>REPETITION</td><td>continuous and invariant in sequence</td><td>for power and mastery</td><td>for pleasure and creativity</td><td>for ritual and learning</td></tr>
<tr><td rowspan="4">INDIVIDUAL VARIABILITY</td><td>developmental stage</td><td rowspan="3">ability and meaningfulness</td><td colspan="2">developmental stage: physical, social, emotional, and cognitive</td></tr>
<tr><td>prior experience</td><td colspan="2" rowspan="2">personality</td><td rowspan="2">relation of skill, strategy, and chance elements</td></tr>
<tr><td>environmental situation</td></tr>
<tr><td colspan="2">interaction of maturation and learning</td></tr>
</table>

both an incentive for playing and a direction of behavior towards the ultimate goal of winning. The element of suspense is present in the open-ended nature of game outcome. The combination in varying degrees of the elements of skill, strategy and chance, acts as a determinant of game success. As such, drive or activation of behavior is ensured and interest is stimulated and sustained.

Participation

Criteria of participation operate in the active involvement inherent in the game process. They include the criterion of physical involvement, the criterion of social involvement, the criterion of emotional involvement, and the criterion of cognitive involvement. The physical element is largely confined to manipulation tasks necessary for playing the game. The social element of games is found in the opportunity for interaction with peers. The emotional element covers reaction to rewards or penalties built into the game and to the ultimate win-or-lose aspect of the outcome of play. The cognitive element is most often one involving problem-solving situations which require the learner to practice or apply what he has been taught.

Reinforcement

Criteria of reinforcement also operate intrinsically in games. The criterion of prompt feedback as to the consequences of one's choice or action is desireable. However, for maximum effectiveness in learning, the criterion of reinforcement should take a positive form.

Repetition

Criteria of repetitive practice assume importance since the games to be considered in this study have the stated purpose of facilitating learning, and learning, by definition, requires practice. Child development has been seen to proceed in an invariant sequence. However, progress in this sequence, is based on the interaction of maturational factors with learning factors. Thus the learning criteria of repetition are to achieve power and mastery. Play criteria of repetition are largely for pleasure and creativity. The criterion of repetition found in games is one of ritual or rule. Game play and progress can be made contingent upon various constraints, which can in turn be based upon the practice of certain skill or factual information.

Individual Variability

Criteria of individual variability must be carefully considered in the selection of games. Of these the criterion of ability and hence of meaningfulness is perhaps the most basic. The criterion of developmental stages, incorporating differences in stages of physical, social, emotional and cognitive development within individual children, affects many aspects of games. These two criteria are partly explained by the prior experience of the individual and by the environmental situation of the moment. In games, however, these criteria of individual variability can be mitigated by the combination of elements of skill, strategy, and chance. The relative weight given each of these elements in a game will influence the

extent to which game outcome is determined by individual ability as opposed to mere luck.

Summary

A summary of these criteria established for the selection of games, as derived from the theoretical principles which operate in child development, learning, play, and games, can be found in Table 3.

CLASSIFICATION AND EXAMINATION OF EXISTING GAMES

As this study has limited its concern to board and card games, it is only these two forms of table games that will be examined and classified. The continuous popularity enjoyed by table games simplifies this task somewhat. To quote Opie and Opie (1969):

> When children play. . . they engage in some of the oldest and most interesting of games, for they are games tested and confirmed by centuries of children, who have played them and passed them on, as children continue to do (p. 1).

Yet, while table games remain popular, children's preferences for one game over another do change. Sutton-Smith and Rosenberg (1971) studied the changes in the game preferences of American children over a sixty year period, based on four studies done in the years 1896, 1898, 1921, and 1959. They did not find a clear trend for games in the "board and card games" category, but they seemed to be played less often than they used to be. More specifically while some games, such as parchesi, lotto, and dominoes, were ranked lower than previously, similar types of games,

TABLE 3

SUMMARY OF THE CRITERIA ESTABLISHED FOR SELECTING GAMES

Theoretical Principles →	Criteria for Selecting Games
Motivation	Intrinsic Motivation: competition suspense skill, strategy and chance combinations interest
Participation	Active Involvement: physical manipulation social interaction emotional reaction cognitive problem-solving
Reinforcement	Intrinsic Reinforcement: prompt feedback positive reinforcement
Repetition	Repetitive Practice: learning - power and mastery play - pleasure and creativity games - ritual or rule - skill or knowledge
Individual Variability	Developmental Stage: physical, social, emotional, and cognitive Ability and Meaningfulness: prior experience environmental situation Skill, Strategy, and Chance: interrelationship and degree of influence on game outcome

such as bingo, monopoly, and scrabble, had replaced these in popularity. Chess, snap, checkers, and cards still ranked as highly as before, and puzzles and tick-tack-toe had improved in popularity. Despite these fluctuations in popularity, however, it is evident that children today continue to enjoy these types of games.

Different bases of classification of games were reviewed by Avedon and Sutton-Smith (1971). Classifications based on "human activities," "the number of human players," "pay-off or results" and "contest for power" are not applicable to board and card games as these games are all of the same class when considered in these ways. They use "human activities" merely to stimulate further interest and offer variety. The number of human players is kept between two and four as young children get restless in larger sized groups. The pay-off or results are the satisfactions of playing and/or winning. The contest for power is always one of striving to achieve power -- power is usually not ascribed in these games. Classification on the basis of "the artifacts used in the game" does help make a distinction between (1) card games, which use only a set of cards, and (2) board games, which may use a set of cards, but which basically require game boards, place markers, and counting devices. This distinction can be further refined when games are classified on the basis of "universal concepts." Avedon and Sutton-Smith specify these as the "outcome attributes" of skill, strategy, and chance or luck.

1. Skill. The outcome is determined by the players'

activity.

2. Strategy. The outcome is determined by rational choices among possible courses of action.
3. Chance. The outcome is determined by some uncontrolled factor governed by the laws of nature.

It is the various permutations and combinations of these three attributes that determine the many subdivisions of card games and board games.

A review of the criteria this study has established for selecting games, as elaborated on page 67, supports this basis of classification of games. The criteria of active involvement, intrinsic reinforcement, and repetitive practice are common criteria of most card games and board games. It is the criteria of intrinsic motivation and individual variability that involve varying degrees of skill, strategy, and chance. Competition, suspense, and interest in a game are sustained whether it is based on skill, on strategy, on chance, or on some combination of these attributes. However, these attributes must be involved in such a way that success is not determined solely by individual differences in ability. In this way chances of game success are somewhat equalized for individual participants and motivation is sustained.

Existing games that are considered popular with young children will be examined in the context of these two types of classification. Card games and board games will be considered in turn with respect to their skill, strategy, and/or chance base. In addition, each of these games will be described as to the actual form the game takes.

Card Games

Card games are defined, for purposes of this study, as any game in which the main action centres on the use of a deck of specially marked cards. These cards will also be referred to as "playing cards." The following card games are thought to be representative of the different types of card games children enjoy playing, and are arranged in order from simple to more complex.

War. War is a simple game which combines chance with some very basic skill. It is played with cards having number values but does not require complete decks. To play the game, all the cards are divided among all the players (for a maximum of five players). Each player puts his cards in a pile face down. At the count of three, each player turns up his top card and "shoots" it into the middle. The player whose card bears the highest number value captures all the cards in the middle. When the highest number value is shot out by two or more players, a "war" ensues. The stakes are made higher. Each of the warriors places three cards face down on top of his first card. Then each turns up a fourth final card on top of his pile and the highest number value again captures all the cards in the middle. The game continues until one player has captured all the cards, or, at any point in time the player with the most cards can be declared winner. The chance element lies in which cards will turn up. The skill element is that of recognizing and appreciating relative number values.

Concentration. This is a game of skill and to a lesser

degree, of chance. To play the game a deck of playing cards, having various sets of four of a kind is spread out face down. Each player, in turn, turns up two cards. If they are members of the same set, he may keep them and take another turn. If they do not belong to the same set then he must turn them face down again in exactly the same spot in which he found them. Other players try to "concentrate" and remember the location and identity of these cards. If they should chance to turn up a card that matches one of them, they can then instantly find its pair and take another turn. The player having collected the most sets when all the cards are gone is the winner. The skill elements involved in this game are thus recall, and ability to recognize similarities and differences. The chance element lies in which card one happens to turn up.

Dominoes.. Although normally played with wooden blocks, this game will be classified as a card game. The face of each domino block is divided into two halves, each of which is marked with from zero to six dots or "dominoes." This is a game of skill and chance. To play the game, the twenty-eight domino blocks are placed face down in the middle and each of the two or three players takes seven domino blocks for his hand. The first player sets down one block. The next player must select a block from his hand which matches either half of the block played by the first player. The third player then attempts to match one of his blocks to either end of the domino chain. If a player cannot find a block to match either end of the chain, he misses his turn to play a domino block. If no player

can match either end of the chain then each player picks another block from those remaining in the middle or the "bone yard." Play proceeds until a player puts down his last domino block and calls out "domino." He is the winner. The skill element of this game is in the ability to match like markings, that is, the recognition of similarities and differences. The chance element lies in which domino blocks one happens to choose, and which blocks one's opponents put into play.

Fish. This is a game of skill, chance, and to a lesser degree, of strategy. To play the game, a deck of playing cards having various sets of four of a kind is used. The two to four players are each dealt a hand of five cards to begin play and the remainder of the deck is turned face down in the "fish pond." As the object of the game is to collect as many sets of four as possible, the first player asks the other players for a particular card that will match up with a card already in his hand, for example, "have you any sixes?" If they have any of these "sixes" they must give them to him, and he can continue asking for cards as long as at least one of the other players is able to meet his request. When no one has the requested card in their hand, the player is told to "fish" for it. He takes the top card in the "fish pond" pile. If, by chance, this is the card he was asking for, he is allowed to fish again. Then the next player takes a turn. Play continues until all the cards are gone and all the sets have been completed. The player who "fished" the most sets is the winner. The skill element involved

is that of matching cards into sets. The chance element lies in which cards one receives both from other players and from the fish pond. The strategy element lies in noticing which cards each of the opposing players are collecting and then, if one chances to fish out one of these desired cards, to request it on one's next turn and so be assured of receiving what one requested and continuing one's turn.

Gin Rummy. This is a more complex game of skill, chance, and to some extent strategy. To play the game, two or three players are each dealt ten cards from a deck of regular playing cards. The remaining cards are placed face down in the centre, and the top card is then turned over and placed face up to begin a "discard" pile beside the first pile. The object of the game is to arrange one's ten card hand into sets having at least three members. These sets can be matched sets, for example 3, 3, 3, or consecutive sets, for example 2, 3, 4, 5. The first player selects a card either from the top of the discard pile or from the top of the face down pile. After considering this card he has the option of keeping it or discarding it face up to the discard pile. If he keeps it, he must discard some other card in his hand, usually the one he needs least, so that he retains only ten cards. The next player does the same and play proceeds in turns. Each player tries to build up sets in his hand. When any player has arranged his ten card hand in sets, he discards his last card face down on the discard pile and calls out "gin." The skill element involves expediently arranging one's cards into sets to complete a hand of ten cards. The chance

element, as in other card games, lies in the cards selected and played. The strategy element lies in noticing which cards one's opponents choose from the discard pile and which cards they discard, and guiding one's own choices accordingly.

Board Games

Board games are defined, for purposes of this study, as any game in which the main action occurs on a specially marked playing board. In addition to a game board, items such as place markers, counting devices, and sets of cards involving skill and/or chance may be required.

Bingo. This is mainly a game of chance although skill is involved to a lesser degree. Marran (1939) saw many adaptations of this game in Lotto, Jingo, Spin-o, etc.

> All these games are a great deal alike. They are played by pulling a number 1 to 100 out of a box which is to be matched with the same number on a numbered master board. . . The number selected . . . is to be found on a numbered card held by one of the players who marks this number on a card by placing a small marker over the number. When any player has five numbers in a row on his card, up and down, across, or diagonally, he calls out the name of the game and is the winner (p. 80).

The skill element in this game involves recognition of similarities and differences. The chance element lies in which numbers are drawn by lot.

Tick-Tack-Toe. This is a game based on strategy. It is a positional game,

> a game in which two players take turns marking either crosses or circles in a block of nine squares, the

> object being to complete a straight or diagonal line of three of one's mark before the other player does (Webster's New World Dictionary, 1960, p. 1523).

The strategy element involves the anticipation of potential board moves and the guidance of one's choices accordingly.

Snakes and Ladders. This board game is based on chance. The aim of the game is to proceed from start to finish, that is, from space 1 to space 100, on this grid board as quickly as possible. To play the game, two to four players in turn, roll a dice and then move their place marker as many spaces as the dice face shows dots. If the space they land on should have a "ladder," they follow it to the top and so advance in the game, if the space has a "snake," they must then follow it downwards and so regress in the game. The first player to reach space 100 is the winner. The chance element lies in the roll of the dice and the "snakes" and "ladders" built into the game to impede or enhance progress.

Monopoly. This is a game of chance and strategy. The rules for play are too complex to describe here but the essential difference between a monopoly-type board game and a "snakes and ladders" type board game will be pointed out. This game is not a race to the finish. The board is a continuous track and is used to mark progress in the game as the players try to gain as much monetary control as possible. Thus, being ahead of other players on the game board track holds no particular advantage. Advantage rests in quantity of game accumulations rather than ordinal board position. The winner of the game is the player who acquires the greatest

"monopoly" over the commodities and services available in the game and so forces his opponents out. The strategy element involves this effort to impede the progress of one's opponents while advancing one's own position. The chance element lies in the roll of the dice that determines where on the board one lands, and the "chance cards" that can unexpectedly reward or penalize a player.

Summary

Selected existing games have been classified and examined. Table 4 shows the classification of these existing games as to board games or card games, and as to the elements of skill, strategy, and/or chance on which they are based.

SUMMARY

This chapter collected the factual data necessary for pursuing the purpose of this study. Relevant principles of child development, learning, play, and games were considered in an attempt to find their interrelationships and express them as one set of principles. Table 2 charted this interrelationship of relevant principles. On the basis of these interrelated principles, criteria for selecting game forms were established as summarized in Table 3. With these criteria as a base, existing table games were classified first as card games or board games, and then further classified as to the degree of skill, strategy, and/or chance required to determine the outcome of play. Table 4 summarized this classification of existing games. In addition, selected existing games that remain

TABLE 4

CLASSIFICATION OF EXISTING GAMES

	NAME OF GAME	SKILL	STRATEGY	CHANCE
CARD GAMES	War	minimal: apreciation and recognition of number values	nil	cards received and exposed
	Concentration	recall of card location and recognition of similarities and differences	nil	cards exposed
	Dominoes	recognition of similarities and differences	nil	blocks received and exposed
	Fish	forming sets	awareness of opponent's strategy	cards received
	Gin Rummy	forming and arranging sets		cards received and exposed
BOARD GAMES	Bingo	recognition of similarities and differences	nil	numbered cards drawn by lot
	Tick-Tack-Toe	nil	anticipation of potential board moves	minimal: opponent's moves
	Snakes and Ladders	nil	nil	roll of dice, and built-in rewards and penalties on game board
	Monopoly	nil	impeding opponents by monopolizing game assets	

popular with young children were examined in the context of the classification of table games, as seen in Table 4, and the actual form of the game described.

CHAPTER 4

PRESENTATION AND INTERPRETATION OF FINDINGS

In this chapter the writer will:

1. examine the representative existing games classified in Chapter 3 to determine their basic forms;
2. present the basic open game forms that emerge;
3. adapt these basic open game forms to meet specific learning objectives through the presentation of selected illustrations.

BASIC FORMS OF EXISTING GAMES

Following the classification of existing games as derived in Chapter 3, the representative games selected will be examined to determine their basic forms. The term "basic form" refers to the actual game form that remains when all the particulars of a specific game are removed, for example, the general structure that remains when the specific content of the game called "Snakes and Ladders" is removed.

Card Games

Within the existing card games examined and classified in Chapter 3, basic forms of card games can be found. Each game will be considered separately in an attempt to extract the form at the base of the particular game.

War. The game of "War" is formed around a deck of fifty or more cards marked with some form of numerical value so that the worth of each card relative to the other cards is easily determined. Game equipment is this deck of cards. A regular deck of playing cards can be used. The purpose of the game is to win as many of the cards as possible, or better still, to win all the cards from all the other players. Game outcome is determined by a combination of the cards received and exposed by chance and, to a lesser degree, by the skills of appreciation and recognition of card values. Game roles are those of two to five players, and that of a card dealer who is usually one of the players.

Concentration. The game of "Concentration" is formed around a deck of cards containing matched pairs. Game equipment is this deck of cards. A regular deck of playing cards, that is, twenty-six sets of two, can be used. The purpose of the game is to obtain as many matched sets of two as possible from the cards available. Game outcome is determined by skillful application of recall of card locations and recognition of similarities and differences to those cards exposed by chance. Game roles are those of two or three players.

Dominoes. The game of "Dominoes" is formed around a set of blocks or cards the faces of which are divided in half. Seven or more basic items are used to make up twenty-eight or more domino card faces. As each card has an item on each half of its face, a total of fifty-six or more items are involved. Game equipment is

this deck of domino cards. The purpose of the game is to play all one's domino cards before one's opponents can play all of theirs. Play proceeds in turns, each player attempting to match one half of a card to either end of the chain of cards that forms. Game outcome is based on a combination of which cards are received and exposed by chance, and the skill of recognizing similarities and differences. Game roles are those of two to four players.

Fish. The game of "Fish" is formed around a deck of cards containing matched sets of three or of four cards. Game equipment is this deck of cards. It can be played with a regular deck of playing cards, that is, thirteen sets of four cards each. The purpose of the game is to collect as many of the matched sets as possible. Game outcome is determined by a combination of skill in forming sets, strategy in being aware of opponents' rationale, and chance exposure of cards. Game roles are those of two to four players and that of card dealer who is usually one of the players.

Gin Rummy. Similar to "Fish" but somewhat more complex, the game of "Gin Rummy" is formed around a deck of cards with two bases for forming sets and their subgroups. Game equipment is this deck of cards. Using a deck of regular playing cards this would mean four sets (or suits) of thirteen items, or thirteen sets of four items. The purpose of the game is to arrange a ten card hand into sets of three or more items, each set having one of the two bases mentioned above. The completed hand may contain sets from both of these groups. Game outcome is determined by which cards are received

and exposed by chance, skill in formation and arrangement of sets, and awareness of opponent's strategy. Game roles are those of the two players, one of whom usually assumes the additional role of dealer.

Summary of Card Game Forms

The basic forms extracted from the selected existing card games are summarized in Table 5. Careful consideration of this summary finds basic qualities of card games emerging, or to phrase it differently, the basic form of card games.

The basic form of a card game is a deck of cards in which the cards contain the elements of various matched sets. Game equipment is a specially-marked deck of cards. The purpose of the game is either to collect as many cards or sets of cards as possible in the course of play, and/or to achieve a particular arrangement of cards, or to play all of one's cards and empty one's hand. Game outcome is always affected by what cards are received or played, coupled with the skill of recognition of similarities and differences of cards and the application of this knowledge in the pursuit of game success. More complex forms of card games usually involve some degree of strategy as well. Game roles are those of two or more players vying for supremacy often with one player assuming the role of dealer.

In seeking distinctive features of card games, for purposes of this study two basic forms of card games can be recognized.

1. The deck of playing cards. This type of card game is exemplified by the game of "Fish," progress being

TABLE 5

BASIC FORMS OF EXISTING CARD GAMES

NAME OF GAME	WAR	CONCENTRATION	DOMINOES	FISH	GIN RUMMY
FORM OF GAME	A deck of 50 or more cards marked with various numerical values. It can be 13 sets of 4 matched values.	A deck containing several matched sets of two cards each. It can be 13 matched sets of 4 cards each.	A set of blocks or cards based on six or more basic items arranged one item to each half of the card face. It can be 28 cards using 7 sets of 8 items each.	A deck of cards containing several matched sets of 3 or 4 cards each. It can be 13 matched sets of 4 cards each.	A deck of cards containing potential sets through the combinations of two major groups. It can be 13 sets of 4, or 4 sets of 13 items.
GAME EQUIPMENT	Deck of cards	Deck of cards	Deck of "domino" cards	Deck of cards	Deck of cards
PURPOSE OF GAME	To win all or majority of cards	To obtain as many matched sets of two as possible	To be first to play all the dominoes in one's hand	To collect as many sets as possible	To arrange a 10-card hand into sets of 3 or more items
BASIS OF GAME OUTCOME	Chance, and (minimal) skill	Skill, and chance	Chance, and skill	Skill, strategy and chance	Chance, skill, and strategy
GAME ROLES	Players (up to 5) Dealer (one of the players)	Players (2-3)	Players (2-4)	Players (2-4) Dealer (one of the players)	Players (2) Dealer (one of the players)

determined by a combination of chance, skill, and strategy in playing the specially marked cards.

2. The domino-type deck of playing cards. An example of this type of game is obviously "Dominoes" success being determined by chance and skill. The distinction between these cards and the "playing cards" is found in the split face of each domino card, equivalent to the combination of two playing cards.

Board Games

Within the existing board games examined and classified in Chapter 3 basic forms can be found. In attempting to extract the basic form of each particular game, these games will be considered separately.

Bingo. The game of "Bingo" is formed around individual cards with a twenty-five square grid, a different item being marked on each square. As these items are selected from thirty to one hundred potential items, no two cards are alike. Game equipment includes these individual cards (one per player), a master card having all possible items marked on, plain markers to place on individual cards (twenty-five per player), and a counting device that randomly selects from among the possible items, most often in the form of a shaker containing marked discs for all potential items, or a similarly marked spinner. The purpose of the game is to complete a row of five items in any direction, or to complete the whole card, by marking any of those items, drawn by lot, which appear on one's card.

Game outcome is mainly determined by chance although a minimal amount of skill in recognizing similarities and differences is required. Game roles are those of two or more players (as many players as there are individual cards can play), and that of a caller who selects, calls out, and records items on the master board, and checks winning cards.

Tick-Tack-Toe. The game of "Tick-Tack-Toe" is formed around a game board with a blank nine square grid. Game equipment is this blank gameboard and two distinctive marks, either two sets of five markers each (often crosses and circles) or something with which to write one's mark. The purpose of the game is to complete a row of three of one's mark in any direction before one's opponent does. Game outcome is determined largely by the strategy of anticipating potential board moves as well as a minimal amount of chance. Game roles are those of the two opposing players.

Snakes and Ladders. The game of "Snakes and Ladders" is formed around a game board with a sectioned path leading from start to finish. Built into the board path, on certain sections, are advances (in the form of "ladders" leading ahead) and regressions (in the form of "snakes" leading backward). Game equipment consists of this game board, individual place markers (one per player), and a counting device, such as dice or a spinner. The purpose of the game is to proceed from the starting point to the finishing point before any other player does. Game outcome is based solely on chance in the form of how far the counting device allows one to progress in

a turn, and in the form of the built-in advances and regressions that await the players. Game roles are those of two to four players.

Monopoly. The game of "Monopoly" is formed around a game board with a sectioned path that continues around the board, that is, the board is continuous; there is no finishing point on the board. Built into the board path are instructions leading to rewards or penalties. Game equipment consists of this game board, individual place markers, a counting device (usually dice or spinner), and chance cards and game resources that offer various rewards and penalties, as well as cards that require some rational choice on the part of the player. The purpose of the game is to use the board path as a means of marking game progress and of simultaneously offering chances to acquire as many of the available game resources as possible. The winner is not the first player to finish a circle of the game board; the winner is the player who acquires the most, or all, of the available game resources in the course of play. Game outcome is determined by a combination of chance which decides where on the board one will land and consequently what rewards or penalties will come one's way, and strategy in making decisions that will increase one's monopoly of game resources while preventing one's opponents from doing so. Game roles are those of the two to four players, and that of the banker (usually one of the players) who controls and distributes game resources.

Summary of Board Game Forms

Table 6 summarizes the basic forms which were found to exist in the selected board games. Consideration of this table brings to light certain basic similarities among board games as well as certain distinct differences of form.

The form of these game boards is either a grid or a path. Game equipment always includes the game board (or boards), and individual place markers; and in some games, counting devices and decks of specially marked cards are also required. The purpose of the game is either to try to be first to achieve a certain position on the board, be it the finishing point or a certain arrangement of markers, or to try to collect as many of the available game resources as possible in the course of play, board position being important only in so far as it assists the player in achieving this latter purpose. Game outcome is determined to some extent by chance in all board games, however as one progresses from simple to more complex game forms, one sees that games involve almost pure chance at first, then some skill in addition to chance, and finally some element of strategy. Game roles are usually those of the players although an additional role which is supervisory rather than competitive may be necessary.

In looking for distinctive features of board games, for purposes of this study four basic forms of game boards, and hence of board games, can be recognized.

1. The chance grid board. An example of this type of game board is found in the game of "Bingo," progress on the

TABLE 6

BASIC FORMS OF EXISTING BOARD GAMES

NAME OF GAME	BINGO	TICK-TACK-TOE	SNAKES & LADDERS	MONOPOLY
FORM OF GAME	Individual cards with 25-square grid, marked with 25 of 30-100 possible items, and 30-100 separate discs marked with all items.	A blank grid of 9 squares and two distinct sets of markers.	A sectioned path from start to finish, with built-in advances and regressions.	A sectioned path (continuous), with built-in instructions that lead to rewards or penalties.
GAME EQUIPMENT	Individual marked cards (no two alike) Master card with all possible items. Markers (at least 25 per player) Marked item discs or marked spinner	Grid board Two sets of markers (5 per set) or a marker to write with.	Start-finish path game board (see above) Markers (1 per player) Counting device (dice or spinner)	Continuous path game board (see above) Asset cards and objects Money Chance cards Markers (1 per player) Counting device (dice or spinner)
PURPOSE OF GAME	To be first player to complete 5 squares in a row, or to complete a whole card	To complete a row of 3 in any direction before one's opponent does	To be the first player to proceed from start to finish	To acquire the most assets (or all the assets) in the course of play
BASIS OF GAME OUTCOME	Chance and (minimal) skill	Strategy and (minimal) chance	Chance	Chance and strategy
GAME ROLES	Players (2 or more) Caller	Players (2)	Players (2-4)	Players (2-4) Banker

game board being determined by chance.

2. The strategy grid board. The game of "Tick-Tack-Toe" offers an example of this type of game board, success in the game being determined by the use of strategy.
3. The start-finish path board. "Snakes and Ladders" is a game which exemplifies this type of game board, progress towards a successful finish being determined by chance.
4. The continuous path board. An example of this type of game board is found in the game of "Monopoly," the board being used continuously until game resources are depleted. Player progress on the game board allows the chance element to operate and thus provide opportunities for the application of strategy towards the ultimate goal of game success.

OPEN GAME FORMS

The game forms that were recognized as the basis of the selected existing games can be extracted further and presented as basic open game forms. Game forms are offered as just what the term "form" suggests -- blank, or "open" arrangements, devoid of any specific content. Yet no one form is ever expected to cover all situations, thus several basic game forms are offered, each incorporating certain characteristics and excluding others. The task of the teacher is to select those open game forms which best suit her purposes and then to proceed to fill them in with relevant content so that they become useful tools in specific learning

situations. In this way basic open game forms can be adapted for specific teaching and learning objectives as defined by the teacher.

Presentation of Basic Open Game Forms

The preceding examination of existing card games and board games revealed that six basic forms can be recognized. Through the extraction of these basic forms of games this study hopes to present some basic open game forms which can easily be adapted for specific purposes. The forms to be presented are:

1. The deck of playing cards.
2. The domino-type deck of playing cards.
3. The chance grid game board.
4. The strategy grid game board.
5. The start-finish path game board.
6. The continuous path game board.

Each form will be illustrated in its basic open form and its basic characteristics discussed.

The deck of playing cards. While the truest illustration of the open form of a deck of playing cards would be a deck of blank cards, this is understandably not the best illustration. Thus, a deck of regular commercial playing cards will be used as the basis for discussion of this game form. Each card in the deck has two dimensions -- one of the four suits, and one of the thirteen number or picture subdivisions. While the simpler card games focus on the thirteen sets of four, that is, ace, one, two . . . king, more complex games may require awareness of both dimensions of playing

cards. Thus the basic characteristics of a deck of playing cards are found in its two dimensional quality as well as in the various matched sets it contains. The presence of these characteristics is easily ensured if the open game form is considered as a grid. Figure 5 illustrates the basic open form found in a deck of playing cards each square on the grid representing a different card. Letters and numbers applied to a fifty-two card deck are used for purposes of clarity but adaptations of this basic open game form will substitute specific content and vary the size of the deck to suit specific purposes.

It must be emphasized that a deck of playing cards need not be a fifty-two card deck containing thirteen sets of four. All that is basic to this form is the two dimensions of the deck. For example, a thirty-six card deck could be designed having nine sets of four, twelve sets of three, or eighteen sets of two, depending on the purpose for which it was intended.

The domino-type deck of playing cards. Once again, the basic form of these cards would be blank cards with a dividing line down the centre. However, for discussion purposes, a common set of twenty-eight domino cards will be referred to. The faces of the cards are decorated with all possible combinations of seven distinct items. These cards have only one dimension on which the player must concentrate, that is, the seven basic items. Thus, the basic characteristic of a deck of domino-type playing cards is found in the various combinations of the selected items. Figure 6 (on page 98) uses a

	A	B	C	D
1	1A	1B	1C	1D
2	2A	2B	2C	2D
3	3A	3B	3C	3D
4	4A	4B	4C	4D
5	5A	5B	5C	5D
6	6A	6B	6C	6D
7	7A	7B	7C	7D
8	8A	8B	8C	8D
9	9A	9B	9C	9D
10	10A	10B	10C	10D
11	11A	11B	11C	11D
12	12A	12B	12C	12D
13	13A	13B	13C	13D

Figure 5

The Basic Open Form Found in a Deck of Playing Cards Based on a 52 Card Deck

	0	1	2	3	4	5	6
0	0/0	0/1	0/2	0/3	0/4	0/5	0/6
1	1/0	1/1	1/2	1/3	1/4	1/5	1/6
2	2/0	2/1	2/2	2/3	2/4	2/5	2/6
3	3/0	3/1	3/2	3/3	3/4	3/5	3/6
4	4/0	4/1	4/2	4/3	4/4	4/5	4/6
5	5/0	5/1	5/2	5/3	5/4	5/5	5/6
6	6/0	6/1	6/2	6/3	6/4	6/5	6/6

Note: Underlined combinations are omitted in a twenty-eight card deck as they are merely the reversal of combinations already presented.

Figure 6

The Basic Open Form Found in a Deck of Domino-Type Playing Cards Based on a Twenty-Eight Card Deck

square grid to consider all possible combinations that can be used in the basic open form of this game. Each square of the grid represents a different combination and those combinations which are repeated in the reverse have been underlined. These reversed combinations may be included or omitted as desired. As dominoes often look the same when turned around (for example, the dotted domino cards), to include these reversed combinations would in many cases be pure duplication.

It must again be emphasized that a deck of domino-type playing cards need not be a combination of seven items resulting in twenty-eight cards. However, to get enough combinations to ensure adequate choice in actual game play, the number of selected items (for example, eight items) must be squared (that is, sixty-four possible combinations) and then any combinations that are duplicated may be omitted (thus leaving thirty-six domino-type cards). All that is characteriszic of this game form is the combination of the selected items in all possible combinations.

The chance grid game board. The basic form of this type of game is found in the actual game board each player uses. The board takes the form of a square grid, that is, as many squares across as down. In this way diagonal lines will contain a number of squares equivalent to the number contained by lines across or down. The most common grid for this type of game board contains twenty-five squares and this grid will be used as a basis for discussion. There must, however, be more items than there are squares if the game is

to be competitive. Anywhere from thirty to one hundred items are commonly used. To ensure that every card is different the total number of items is divided into as many groups as there are rows, and each vertical row is allotted a group of items. In this way each row of five squares has anywhere from six to twenty potential items with which it can be marked. By having more items in each group than there are places in the row, each row will contain at least one different item and similar items will have different positions in the row, ensuring that no two rows or cards are alike. Figure 7 illustrates this open game form on a twenty-five square grid using a total of thirty items. No two cards are alike as the five items in each vertical row were selected from the allotted group of six and then arranged in random order on the card. The use of only thirty items on a twenty-five square grid limits the number of possible cards to six, but an increase of the total number of items to, for example, fifty items, would increase the total number of possible cards in this case, to as many as two hundred and fifty-two cards.

The twenty-five square grid is offered only for purposes of explanation. Chance grid game boards can take the form of a nine square grid, a sixteen square grid, a thirty-six square grid, etc., depending on the purposes for which it is intended.

By ensuring that no two rows in any direction are alike and that each card differs from every other card by at least one item, many different games, based on chance selection of game items, become possible. The basic characteristic of this game form is

1	8	16	22	27
5	10	18	19	25
2	12	13	20	30
4	9	15	24	28
3	11	17	23	26

2	7	17	24	25
5	11	13	22	26
3	10	18	19	30
4	8	14	21	27
6	9	16	20	29

6	11	17	24	28
3	7	14	19	26
1	9	13	23	25
2	12	16	21	30
4	10	15	22	29

4	7	18	20	25
6	12	17	19	30
2	8	15	23	27
5	10	16	24	28
1	9	14	21	29

6	10	14	19	29
1	7	13	23	30
3	8	18	22	26
2	11	15	20	28
5	12	17	21	27

5	9	13	20	28
6	12	15	22	25
1	7	14	21	29
4	11	16	24	26
3	8	18	23	27

Figure 7

The Basic Game Form Found In a Chance Grid Game Board
Based on a 25-Square Grid Using a Total of Thirty
to Give Six Different Card Possibilities

therefore the arrangement of items on the specially-marked game boards to ensure chance determination of game outcome.

The strategy grid game board. The basic form of this game is found in the game board on which play proceeds. This board is always a nine square grid. Two players, in turn, try to complete a row of three in any direction while simultaneously trying to prevent the opponent from doing so first. Thus the basic characteristic of this game form is the strategy players must use to anticipate potential board moves. The basic open form of the game is the blank board described above as illustrated in Figure 8.

The start-finish path game board. Once again the basic form of this type of game lies in the game board. The game board bears a sectioned path which leads from a starting point to a finishing point. This sectioned path along which the players race is the basic characteristic of this game form. Although progress along this path is determined by a counting device, additional chance elements can be built into the board path in various ways. Examples of basic forms of a start-finish path game board are found in Figure 9 (on page 104) and Figure 10 (on page 105).

The continuous path game board. The game board is once again the basic form of this type of game. A continuous game board has a continuous path; no finishing point exists on the board. Opportunities to gain or lose game resources are built into the game board. The board functions to guide players as they select

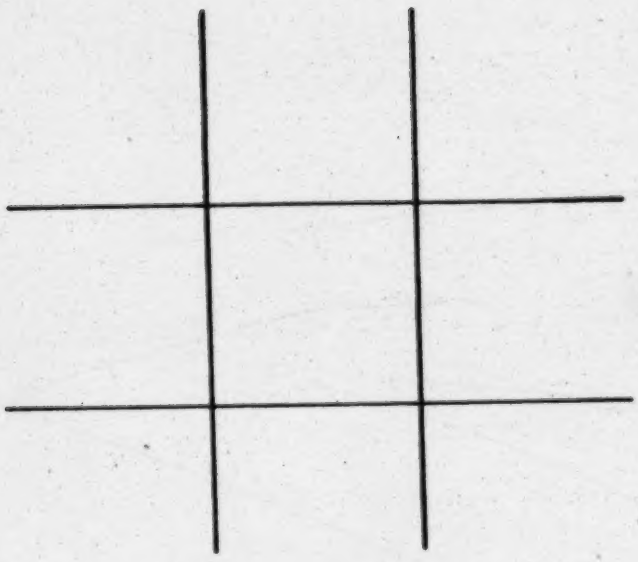


Figure 8

The Strategy Grid Game Board

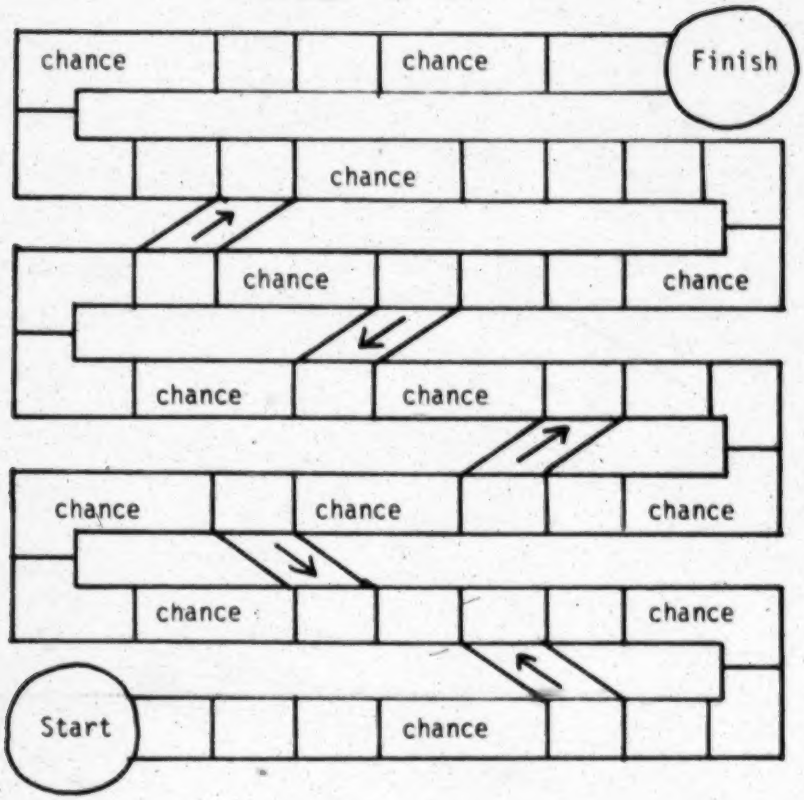


Figure 9

An Example of a Start-Finish Path Game Board

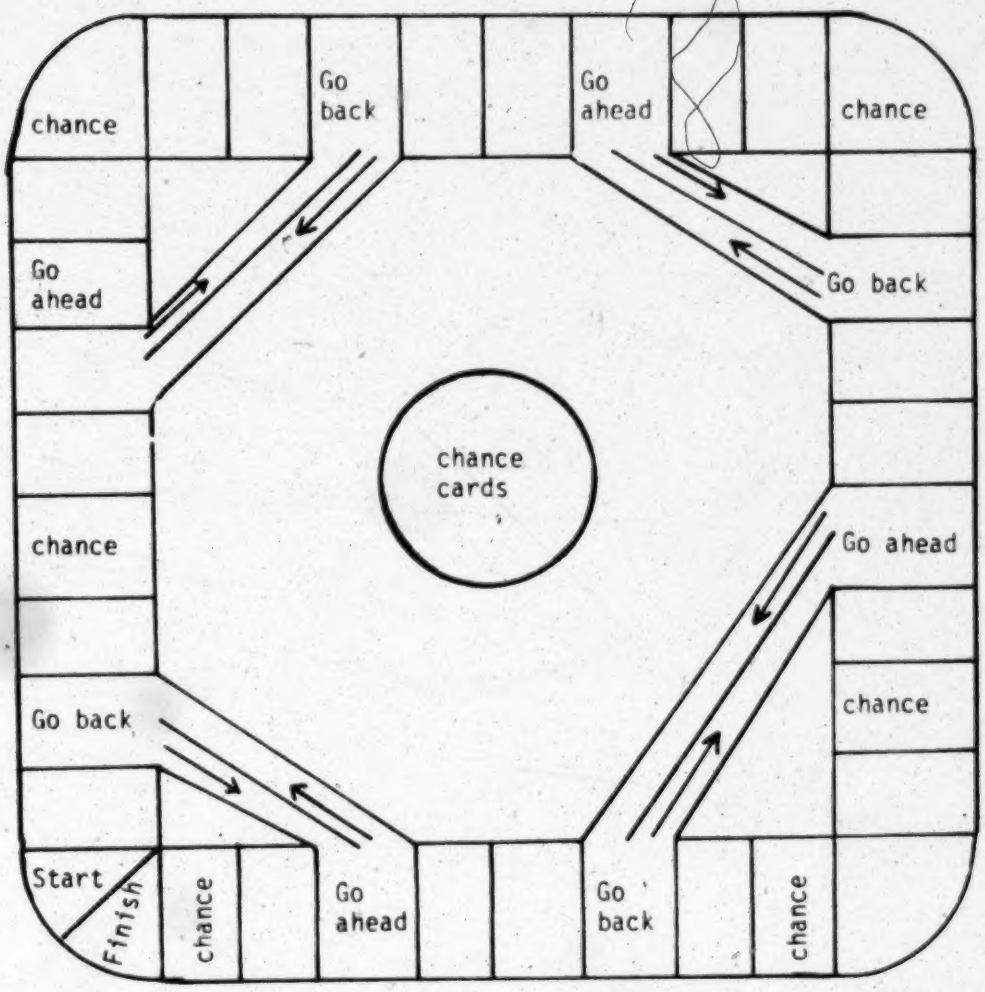


Figure 10

An Example of a Start-finish Path Game Board

resource cards and collect game resources. The finishing point lies in some collection or arrangement or depletion of these resources. The basic characteristic of this game board is thus its continuous path. Figure 11 offers an example of a continuous path game board form.

Summary

The preceding six basic game forms were presented to clarify what is intended by the term "basic game form." Each of these forms was extracted as simply as possible so that the open nature of the form would be readily apparent. To ensure understanding of the basic open form of each game, examples that incorporated the basic characteristics of each form were presented and illustrated. However, it must be stressed that these examples of the six basic game forms were intended to illustrate the characteristics that differentiate each game form from the others. They are not the only forms available, for each of these basic forms can be presented in a variety of ways that preserve the basic characteristics of the game form. Yet these six basic game forms, in all their variations, are still open forms, and as such, they can be adapted for specific purposes.

ADAPTATION OF BASIC OPEN GAME FORMS

The stated purpose of this study is "to extract a general format to help teachers develop specific skills in young children through the use of basic games." To this end, six basic game forms

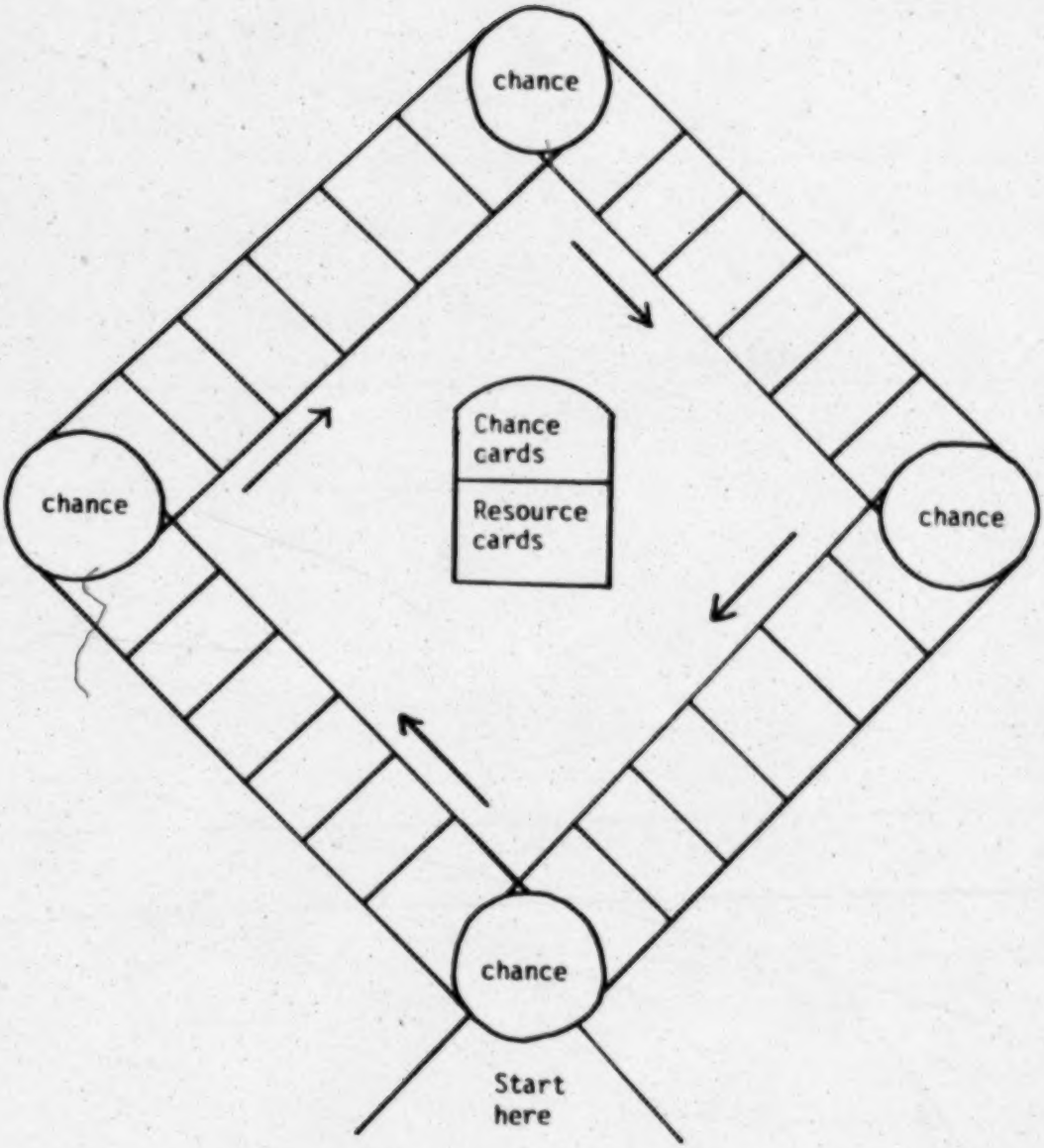


Figure 11

An Example of a Continuous Path Game Board

have been presented. However, these game forms do not in themselves constitute a general format. To extract a format that can be used in the adaptation of these basic games to complement learning, more than these basic game forms is necessary. This general format will include the theoretical principles and basic criteria that operate in games, the requirements of good teaching and diagnosis of individual needs, the basic artifacts essential for the use of games, and clearly defined learning objectives.

Theoretical principles and basic criteria that operate in games have been elaborated in Chapter 2 and applied in Chapter 3. The importance of these must not be minimized. Successful use of games in the classroom depends to a large extent on an understanding of these principles, which include motivation, participation, reinforcement, repetition, and individual variability, and which operate in child development, learning, play, and games. This understanding of principles helps the teacher to capitalize on the advantages these games offer.

Good teaching to fill individual needs is also a priority. These games are not intended to replace good teaching or to diagnose individual needs. They come a step after individual learners have been taught the essential processes and facts. These games are part of the follow-up activities that help reinforce what has been taught and "fix" learning. They are complementary to the learning process rather than supplementary.

Basic game artifacts are essential to any general format using basic games. Teachers wishing to develop open game

forms that can be adapted for a variety of situations are therefore advised to assemble certain basic artifacts for use in these game situations. These artifacts are discussed under the headings that follow.

1. Playing cards. Several blank decks of playing cards should be available for the teacher to fill in with skill content relevant to the specific purposes for which the game is being designed.
2. Game boards. Each of the open game board forms should be available in a variety of themes. The path boards, for example, can be represented as racetracks, rabbit paths, treasure hunts, etc. The grid boards can also incorporate certain elements of make believe. This aspect of representation both allows for various possibilities within each game form and enhances the visual and motivational appeal of the particular game form. It must be stressed that while some of these artifacts are selected for skill development, others are selected just for interest and appeal. Often a theme is used to help achieve these latter purposes.
3. Place markers. Sets of items appropriate to the various representational bases selected for the game boards should be available for use as place markers. Miniature cars, animals, human figures, buttons, etc. are examples of place markers that might be useful on path game boards. The important characteristic of a place marker

is that it be easily distinguished from the other markers.

4. Counting devices. To ensure variety, a selection of counting devices should be available. This selection would include dice in different colours, numbered cubes (or blank cubes on which the teacher could write numbers, number words, or other instructions), and various forms of spinners (that is, a spinning arrow on a sectioned wheel).

5. Chance cards. Although there is an element of chance inherent in most of these game forms, further chance elements can be built into the game through the use of "chance cards." These can be wild or "joker" cards in a deck of playing cards, or they can be the result of landing on a board section marked "chance." These cards offer rewards or penalties, this being the "chance" one takes in drawing one of these cards. Instructions on chance cards might read "miss one turn" or "take an extra turn" or simply "+2" or "-3". When adapted to the selected themes the message might change to "flat tire -- miss one turn" or "swift current -- move ahead five spaces."

Clearly defined objectives for learning are perhaps the most important aspect of any general games format. The actual objectives will be stated in terms of the particular content selected for the game, but the need for these objectives at the point of game design

cannot be underestimated.

Adapting Games for Specific Purposes

Within the general format outlined above, games can be adapted for specific purposes using the basic open game forms presented. The essence of this adaptation is found in the actual content of the game. This content, however, must be selected in light of the specific skill purposes for which the game is to be used. The classification of games used in this study focused on three aspects of content, namely the skill, strategy, and chance requirements of each game. While the basis for the adaptation of any game form for specific learning purposes is the skill content incorporated into the game, strategy and chance elements cannot be ignored.

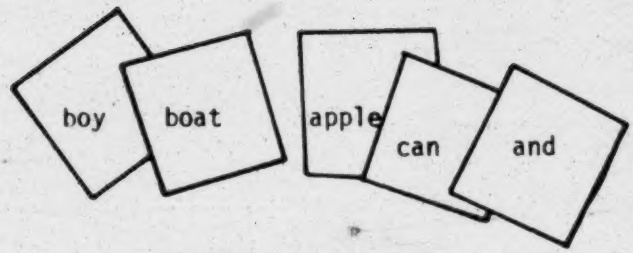
The element of strategy, while not basic to all game forms, is often found in more complex games and is applied more successfully by older children. It has been elaborated in those game forms where it operates, and these references are thought sufficient for purposes of this study.

The element of chance is present in every game form. Part of the appeal of games is accounted for by this element of chance since it partially removes control of game outcome from skill or strategy of the players and transfers it into the realm of chance or luck. In this way, learners of different ability levels can compete on a more equal footing as success or failure is not totally accounted for by inadequate skill or strategy abilities.

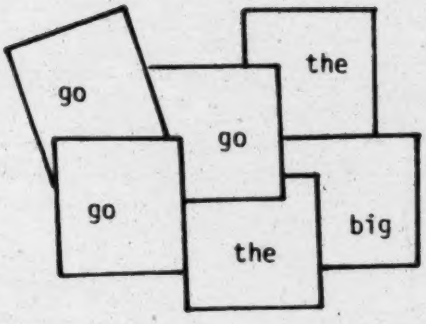
The element of skill, however, has the most bearing on

adaptation of games for specific learning purposes. One of the major advantages of the open game form is that it is presented as an "open form" and as such, can be filled in with relevant information. This open game form is also the basic form of the game. Selected skills that students need to practice are incorporated into game forms and it is this incorporation of selected content that effects the adaptation of a basic game form into an actual game that meets specific needs. This crucial process of adaptation should become clearer if each of the six basic game forms is considered with respect to how skill content can be incorporated into the basic game form.

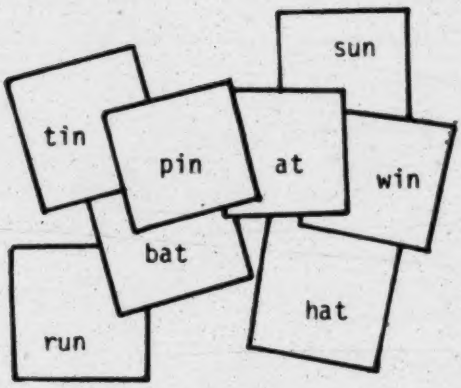
The deck of playing cards. To have any meaning at all, these cards must be specially-marked in some way. Figure 5 (on page 97) illustrated this content requirement of playing cards and plotted out one way of achieving an even distribution of sets. It is the teacher's task to select those skills or facts she wishes her students to practice and to incorporate them into the deck of cards. Illustrations from the language arts are offered in Figure 12. When words are written on cards many skills can be practiced. At the simplest level of vocabulary words, each word would appear on two, three, or four cards depending upon the number required for a complete set. At a more complex level, sets of words that rhyme, begin alike, or are opposite, etc. could be marked onto the cards. Similar adaptations are possible in other areas, such as mathematics, but illustrations of mathematical adaptations will appear on the domino-type playing cards. The complexity of the game, as well as the nature and extent



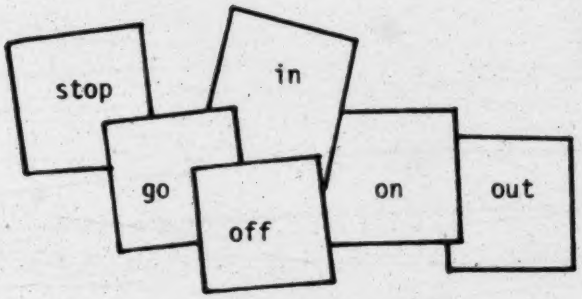
BEGINNING SOUNDS



VOCABULARY WORDS



RHYMING WORDS



OPPOSITE WORDS

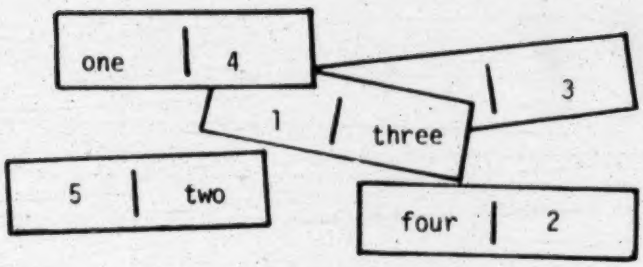
Figure 12

Some Adaptations of a Deck of Playing Cards

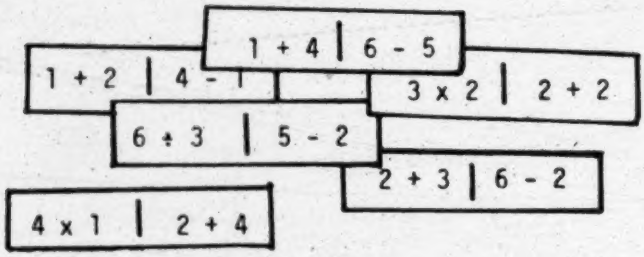
of practice offered by these decks of playing cards will be determined by the game forms into which they are incorporated and the rules applied to game play.

The domino-type deck of playing cards. As with the playing cards discussed above, these cards must also be specially marked. Once the specific content is selected, it can be worked into the deck of cards as was illustrated in Figure 6 (on page 98). In this way players are assured a fair chance of being able to match a domino-type card from their hand onto one end of the chain. All that must exist is some basis for matching. Figure 13 illustrates some adaptations of this game form. In the mathematical examples the basis of the match is the value of the card half and not the actual form marked on the card, that is, "6-2" could be chained to "4x1" as both have a value of "4."

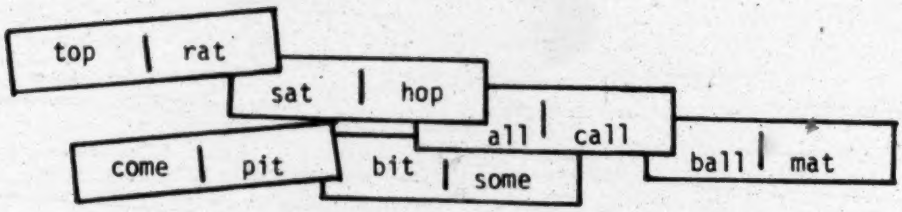
The chance grid game board. To adapt the open chance grid game board form into an actual game such as "Bingo" or "Lotto," sets of individual game boards must be specially marked with the selected skill content for which the game is designed to give practice. Figure 7 (on page 101) illustrated this special marking of cards so that no two rows in any direction, and consequently no two cards, were alike. A set of all the items marked on the cards, as well as a master card marked with all these items, completes the adaptation of the basic form. Although chance grid game boards are presented as an open game form, the adaptation of these forms for specific purposes involves writing on the actual form so that it no longer is an open



NUMBER FIGURES AND NUMBER WORDS



MATHEMATICAL EQUATIONS



RHYMING WORDS

Figure 13

Some Adaptations of a Domino-type Deck

of Playing Cards

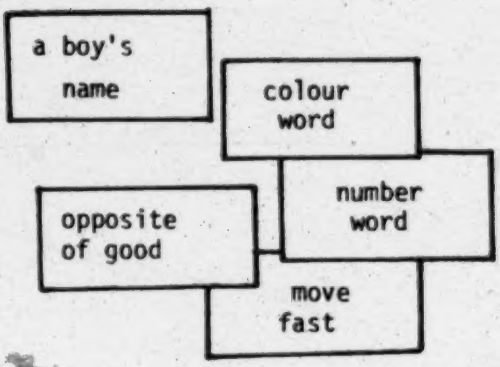
form. It is therefore suggested that copies of these open grid forms (for both the chance grid game boards and the strategy grid game boards that follow) be marked on stencils and an adequate supply duplicated and kept readily available.

The decks of playing cards discussed previously may be used in these game forms if they are designed with more than one game form in mind. If the playing cards offer enough items from which to construct chance grid game boards, then these playing cards can become the cards drawn by lot. In this way the same skills can be practiced in more than one game form.

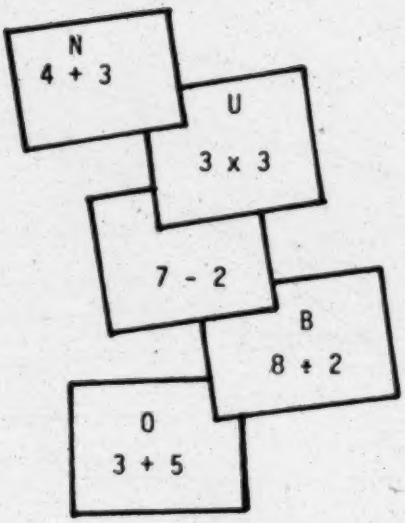
Adaptations of chance grid game boards for specific purposes are illustrated in Figure 14. An example from language arts and an example from mathematics are provided. The item cards must in some way match an item marked on an individual card for the player to mark that item.

The strategy grid game board. The basic characteristic of this game form is the strategy that the players use in anticipating board moves. This strategy remains as the major determinant of game outcome when adaptations are made. However, skill content is worked onto the game board in such a way that the player must exercise the desired skills in order to apply strategy. As with the chance grid game board, a deck of playing cards, if carefully designed, may be used to supply the skill content. An example of a language arts adaptation of this game form is offered in Figure 15 (on page 118). The skill content of the game in this case is nine sets of rhyming words, each

Tom	I	six	to
sun	red	my	sit
bed	it	buy	at
run	out	Nan	bad



WORD RIDDLE LOTTO



NUMBER BINGO

N	U	M	B	O
3	9	0	6	1
5	2	7	8	4
1	4	2	3	8
7	3	5	9	4
0	6	1	4	2

Figure 14

Some Adaptations of Chance Grid Game Boards

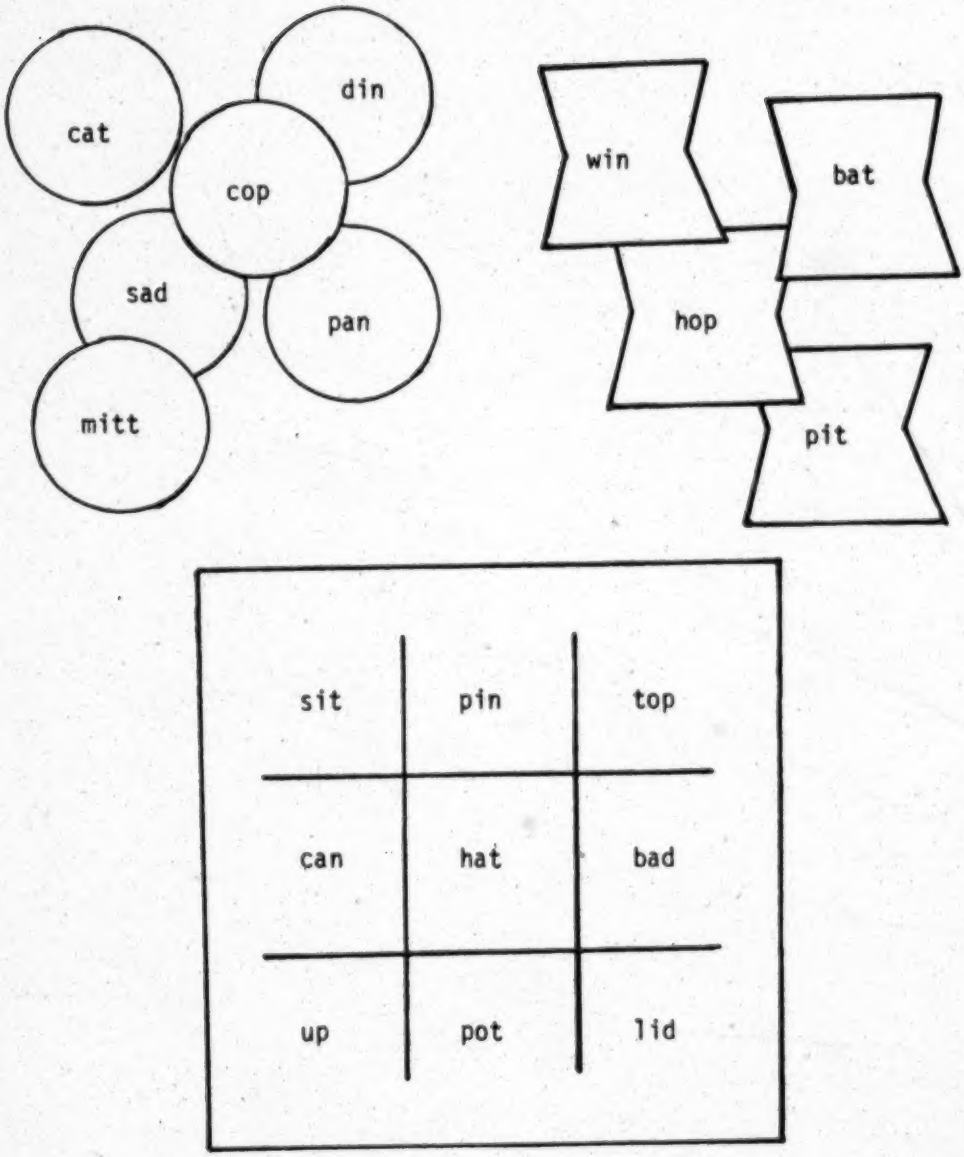


Figure 15

An Adaptation of a Strategy

Grid Game Board

set containing three words that rhyme. One word from each set is placed on the game board, a second word is written on the "cross" cards, and the third word is written on the "circle" cards. A player who wishes to place his mark in the middle box, for example, must find the word in his set of nine marks that matches the word printed on the middle box, in this case the word that rhymes with "hat."

The start-finish path game board. The basic characteristic of this game form is the race along a sectioned path from start to finish according to the fall of the counting device. This ensures the element of chance in determining game outcome. However, skill content is also worked into the game form. The skill content does not become part of the game board as it did in the preceding game forms. The game form is left open so that it can be used to practice many different skills, or many levels of the same skill. This adaptation is achieved by putting a space marked "skill cards" or "resource cards" on the game board, but not on the game board path. Cards involving the selected skill content are put on this space. These cards are in addition to any "chance cards" that may also be put on the game board. The exercise of the skill marked on a particular card becomes a prerequisite to taking one's turn in game play. An illustration of a game board adapted in this way can be found in Figure 16. The steps of playing the game for each turn involve (1) selecting the top skill card (which is face down), (2) exercising the requested skill and returning the card to the

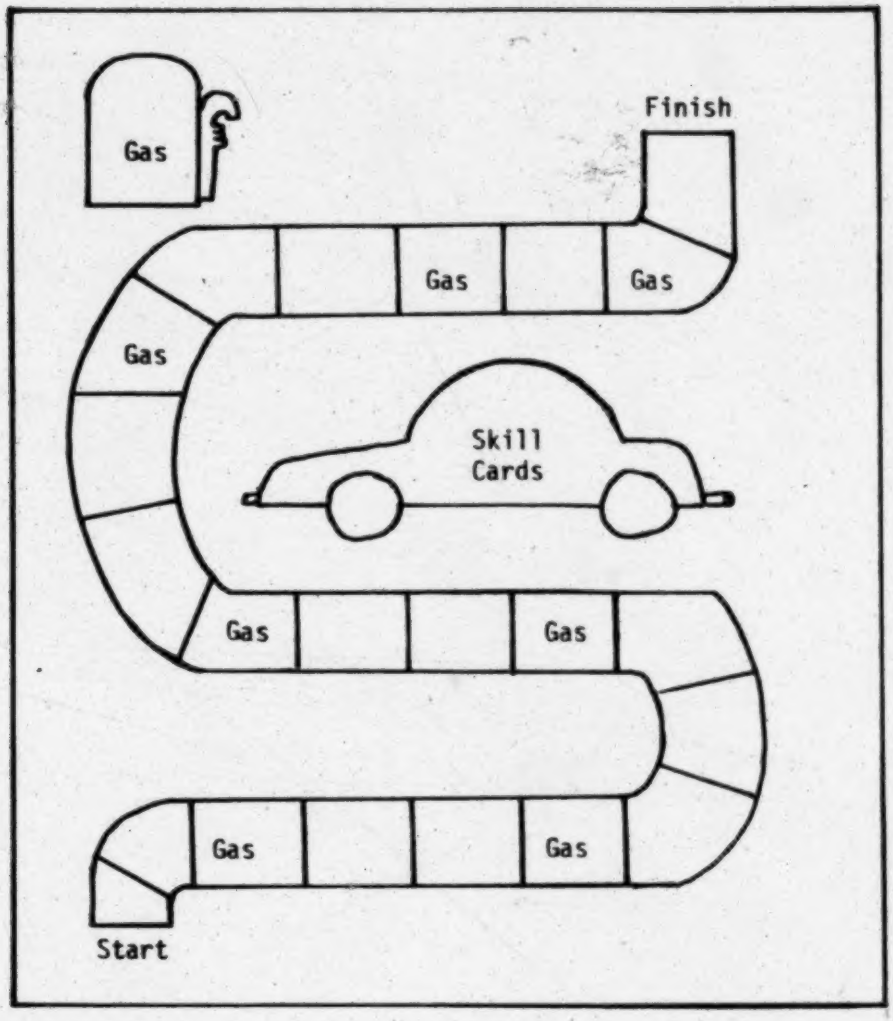


Figure 16

An Adaptation of a Start-finish

Path Board Game

bottom of the pile, (3) if correct (other players being the judge of this), the player then uses the counting device and (4) moves his marker in accordance with what the counting device indicated and so completes his turn. If his marker should land on a section marked "chance" however, he then selects the top chance card (called "Gas" cards on this board) and obeys its instructions. A player who gives an incorrect answer loses his turn to use the counting device and so does not advance along the board path in that turn.

If a deck of cards, which has already been prepared for one of the other game forms, is found to offer the appropriate skill content desired in a particular start-finish path game board, then these cards can be put on the "skill card" space. Thus, it becomes increasingly obvious that a well designed deck of specially-marked playing cards can be used to adapt several of the basic game forms for their specific learning purpose.

The continuous path game board. This form of board game is easily adapted for specific skill content as its basic characteristic is a continuous path along which players travel while collecting as many game resources as possible, game outcome being based on having the most game resources in one's possession when these are depleted. Spaces are provided on the game board for both "chance cards" and "skill cards." The steps of game play are the same as those for start-finish path board games, with one major exception. In a continuous path board game, where the winner is the player who acquires the most game resources and not the player who reaches

"finish" first, "skill cards" are kept by the players when they are correct and only returned to the pile if the skill was not exercised correctly. Since every player uses the counting device every turn, regardless of whether he was correct or not with the skill card, progress on the game board is therefore not the criterion involved in winning. The winner in this game form is the player who is most skillful, namely, the player who collects the most skill cards. One adaptation of a continuous path board game is "Rabbit Hunt," which uses carrots for "chance cards" and "bunnies" as the skill card shape, and is illustrated in Figure 17.

Summary

Basic game forms were adapted for specific learning situations by incorporating skill content into the game form. This incorporation of the specific skills or facts selected for practice is the essence of the process of adapting open game forms. Adaptations of each of the six basic game forms were discussed and illustrated. It should be noted that the same skill content can be incorporated into each of these forms and, in many cases, the same specially-marked skill cards can be the means of adapting the game form to this specific purpose. The added advantage of this is the variety of opportunities offered in which to practice a particular skill.

SUMMARY

In this chapter the existing games derived in Chapter 3 were

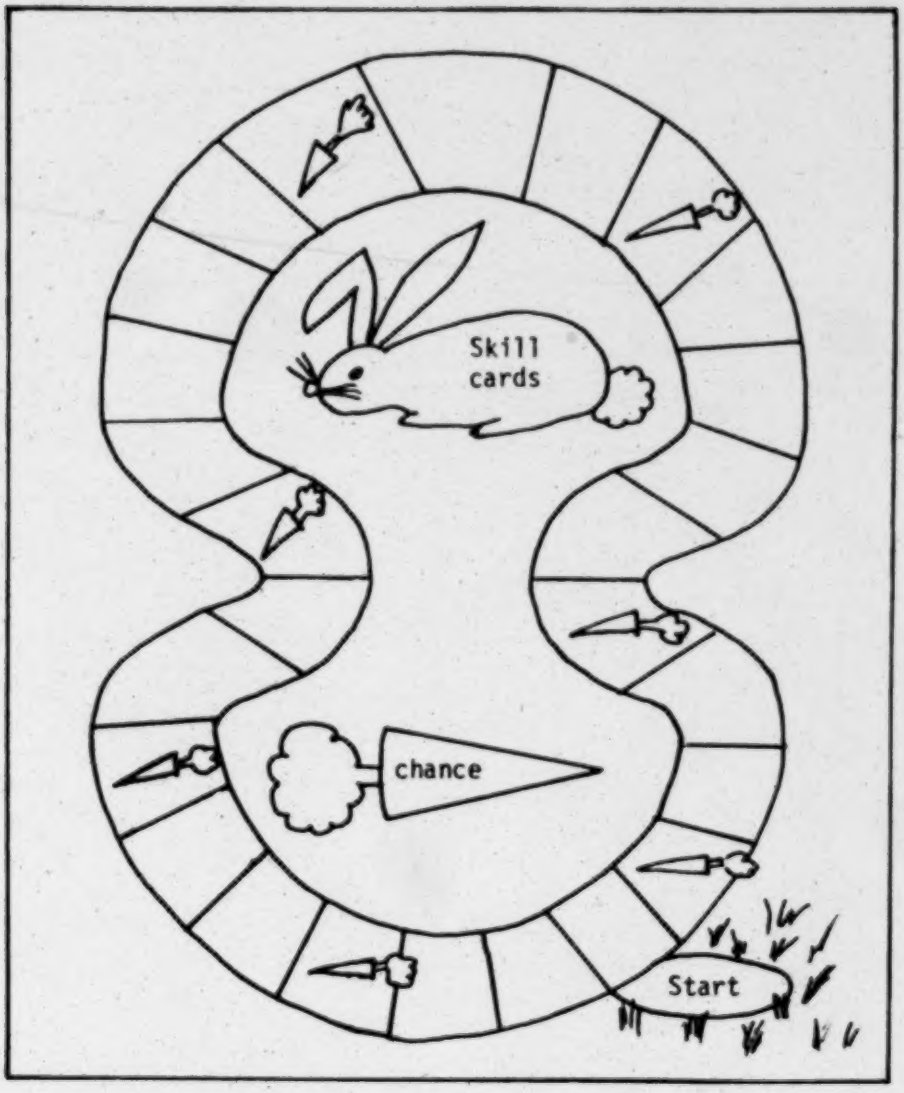


Figure 17

Rabbit Hunt

An Adaptation of a Continuous Path
Game Board

examined and classified in an attempt to extract their basic forms. The resulting basic open game forms were presented as follows:

1. The deck of playing cards.
2. The domino-type deck of playing cards.
3. The chance grid game board.
4. The strategy grid game board.
5. The start-finish path game board.
6. The continuous path game board.

A general format for adapting games was outlined. In keeping with this format, adaptation of each of the basic open game forms was discussed and illustrated with examples of actual adaptations of these game forms for specific skill purposes.

CHAPTER 5

SUMMARY, CONCLUSIONS, AND IMPLICATIONS

SUMMARY OF THE PROBLEM

The purpose of this study was to extract a general format to help teachers develop specific skills in young children through the use of basic games.

The procedure followed was a process of analysis and synthesis of relevant literature and research in an attempt to answer the following questions:

1. What are the relevant theoretical principles underlying learning, child development, play, and games?
2. In the light of these principles, what criteria must be followed for selecting game forms?
3. In the application of these criteria to existing game forms, what basic open game forms are identified?
4. How can these open game forms be adapted for specific purposes and for developing specific skills.

Gathering the Data

A review of relevant theoretical principles from the fields of learning, child development, play, and games, identified the five interrelating principles of motivation, participation, reinforcement, repetition, and individual variability. These principles can be

stated as follows:

1. Motivation. Children learn better when they are motivated to the learning task at hand, and play and games are intrinsically motivating activities.
2. Participation. Children learn better when they are involved in the learning process. Active participation is inherent in play and game activities.
3. Reinforcement. The consequences of an act determine whether or not that act will be repeated. Positive reinforcement improves efficiency of behavioral acts.
4. Repetition. Learning, by definition, involves the principle of practice. Play and game activities are frequently based on repetitive acts.
5. Individual variability. Individuals vary as to age and stage of development, as well as within the various areas of development, namely, the physical, social, emotional, and cognitive.

On the basis of this set of interrelating principles, five criteria for selecting games were established according to a particularized property of each of the above principles. These criteria are intrinsic motivation, active participation, intrinsic reinforcement, repetitive practice, and individual variability.

These criteria were applied to the nine representative existing table games considered popular with young children. These nine games were then classified as (1) card games, including "War," "Concentration," "Dominoes," "Fish," and "Gin Rummy," and (2) board

games, including "Bingo," "Tick-Tack-Toe," "Snakes and Ladders," and "Monopoly." Each game was in turn examined with respect to the elements of skill, strategy, and chance upon which it was based.

Treating the Data

The representative games were then further examined to determine their basic forms. Following the extraction of these basic open game forms, a general format for adapting games for specific learning situations was outlined and its operation illustrated in each of the basic game forms.

FINDINGS

This study extracted and presented six basic open game forms which can be adapted for specific purposes as defined by the teacher. These basic forms are listed as follows:

1. The deck of playing cards.
2. The domino-type deck of playing cards.
3. The chance grid game board.
4. The strategy grid game board.
5. The start-finish path game board.
6. The continuous path game board.

A general format was outlined for adapting these game forms into the actual games that complement learning in specific situations. This format involved six elements. These included: (1) theoretical principles of learning, child development, play, and games, (2) criteria for selecting games, (3) good preliminary

teaching, (4) diagnosis of individual needs, (5) the five basic game artifacts, namely, playing cards, game boards, place markers, counting devices, and chance cards, and (6) clearly defined learning objectives.

Within this general format it was found that these open game forms can be adapted to games that facilitate learning by the incorporation of some specific skill content. Basically, exercise of the selected skill is made a contingency factor in game progress. In the consideration of how skill content could be incorporated into each of the six basic forms listed above, certain basic patterns for selection and arrangement of content were found. Furthermore, it became evident that the same arrangement of specific content could often be used in several different game forms thus adapting more than one form and providing opportunities to practice the selected skill in a variety of game situations.

This study also presented illustrative examples of actual games adapted from these basic forms, thus providing strong proof of the feasibility of using these open forms.

CONCLUSIONS

The following conclusions were drawn from an analysis of these findings.

1. These basic game forms do exist.
2. They can be identified and described in such terms that teachers can adapt them for specific learning purposes.
3. These game materials can become a professional tool for

teachers by basing their use on relevant theoretical principles of learning, child development, play, and games. Teachers can thus use these games more deliberately and take greater confidence in the expected results they achieve.

LIMITATIONS

1. The findings of this study rest on the assumption that the principles as stated are valid representations of the actual processes of learning and development.
2. The criteria established for selecting game forms, which are based on these same principles, are subject to the same limitation.
3. The intangible nature of learning, child development, play, and games must be taken into consideration in interpreting the findings of this study.
4. While the number of existing games selected and used was necessarily limited, these games are representative.

IMPLICATIONS

This study has demonstrated that the adaptation of the basic game forms presented can offer additional means of practicing skills. The findings of this study have five important implications.

1. Classroom use. These game forms offer an instrument that can be widely used in classrooms for young children to provide repetitive practice. They allow the

game, rather than the teacher, to ensure adequate drill in necessary skills as well as control of the players. The role of the teacher can therefore change from that of authority figure and supreme power to that of assistant or guide.

2. Play-way of learning. This study enables the teacher to provide children with opportunities for sufficient practice to ensure over-learning in a play-way that students enjoy. The common goal of repetition and practice is achieved through means other than conventional drill devices which frequently lack the intrinsic motivation of games.
3. Social opportunities. The practice provisions of these game forms can offer opportunities for social interaction with peers that are all too frequently denied young children within the school setting. In this way, opportunities for peer learning can be increased.
4. Independent activities. Familiar game forms which are regularly adapted to suit the specific learning objectives of the teacher can offer students a selection of independent activities which they can use at will. As the pupils will be familiar with the basic forms involved in playing each of these game adaptations, these games serve the additional purpose of freeing the teacher for other teaching activities.
5. Individualizing learning. These game forms, by virtue of their open nature, provide a means of individualizing and personalizing learning situations. The problem of

matching the material to the learner is easily solved in the adaptation of these games for the essence of adapting a game form is found in matching the skill content to the diagnosed needs of the learner.

RECOMMENDATIONS FOR FURTHER STUDY

As a result of this study the following recommendations can be made for further study.

1. Replication of this study with other types of games, using the same process of analysis, could result in other types of basic game forms.
2. Action research in the classroom should be done to test out the practicality of these games.
3. An extension of this study might test the comparative value of these games for individualizing and personalizing instruction for young children.
4. Further research is needed to test out the effectiveness of these devices comparative to other methods for developing skills through practice.

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